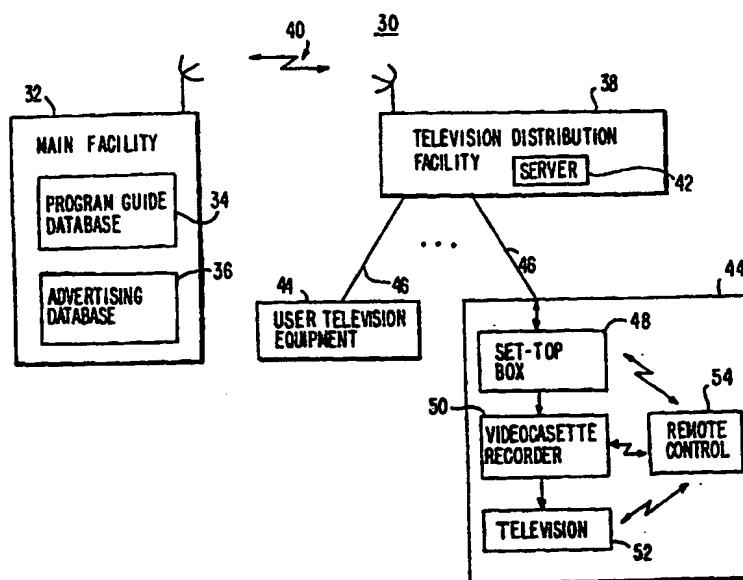




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US99/04163 <b>(22) International Filing Date:</b> 25 February 1999 (25.02.99) <b>(30) Priority Data:</b> 09/034,939      4 March 1998 (04.03.98)      US <b>(71) Applicant:</b> PREVUE INTERNATIONAL, INC. [US/US]; 7140 South Lewis Avenue, Tulsa, OK 74136 (US). <b>(72) Inventors:</b> KNUDSON, Edward, B.; 11055 West Rowland Avenue, Littleton, CO 80127 (US). ELLIS, Michael, D.; 1300 Kingwood Place, Boulder, CO 80304 (US). KNEE, Robert, A.; 747 Grissom Drive, Lansdale, PA 19446 (US). CARPENTER, Kenneth, F., Jr.; 544 South Brentwood Drive, Mount Laurel, NJ 08054 (US). <b>(74) Agents:</b> TREYZ, G., Victor et al.; Fish & Neave, 1251 Avenue of the Americas, New York, NY 10020 (US).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published <i>With international search report.</i>

(54) Title: PROGRAM GUIDE SYSTEM WITH TARGETED ADVERTISING



## (57) Abstract

An interactive television program guide system is provided in which targeted advertisements may be presented to a user and targeted actions taken in the program guide based on the user's interests. The program guide monitors the user's interactions with the program guide to determine the user's interests. Interactions that may be monitored include interactions that indicate the categories of programming that interest the user (e.g., movies, sports, children's programming, etc.), setting a reminder for a program, purchasing a program, requesting information on a program, browsing program listings for a particular time or channel, etc.

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## PROGRAM GUIDE SYSTEM WITH TARGETED ADVERTISING

Background of the Invention

This invention relates to interactive television program guides, and more particularly, to techniques for presenting targeted advertising to users of such television program guides.

Cable, satellite, and broadcast television systems provide viewers with a large number of television channels. Viewers have traditionally consulted printed television program schedules to determine the programs being broadcast at a particular time. More recently, interactive electronic television program guides have been developed that allow television program information to be displayed on a viewer's television.

Interactive program guides are typically implemented on set-top boxes. Such program guides allow users to view television program listings in different display formats. For example, a user may instruct the program guide to display a grid of program listings organized in a channel-ordered or a time-ordered list. Users may also search and sort program

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listings by theme (e.g., movies, sports, etc.) or by title (i.e, alphabetically). A user may obtain additional information for a program by placing a highlight region on a desired program listing and  
5 pressing an "info" button. The user may purchase a pay program from the program guide by placing the highlight region on a program listing and pressing an "OK" button. Some systems allow the user to select a program for recording by placing the highlight region  
10 on a program listing and pressing a "record" button.

The user's interactions with the program guide are indicative of the user's interests. For example, if the user purchases a pay-per-view movie, making that purchase shows that the user is interested  
15 in movies of that type. Searching for program listings in the category "sports" indicates that the user is interested in sports. Although the user's interactions with the program guide indicate the user's interests, previously known program guide systems have not  
20 monitored or used this information. As a result, previous systems have not been able to present targeted advertisements to users or to take targeted actions in the program guide based on the preferences the users have expressed by their interactions with the program  
25 guide.

It is therefore an object of the present invention to provide a program guide system that determines a user's interests by monitoring the user's interactions with the program guide and that presents  
30 targeted advertising or takes a targeted action in the program guide based on the user's interests.



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It is also an object of the invention to provide an arrangement for monitoring the effectiveness of targeted advertisements and targeted program guide actions.

5   Summary of the Invention

These and other objects of the invention are accomplished in accordance with the principles of the present invention by providing a system having an interactive television program guide that monitors the  
10   user's interactions with the program guide to determine the user's interests. The program guide may display targeted advertising or take a targeted action in the program guide based on this determination of the user's interests.

15           Targeted advertisements may contain text, graphics, or video. Targeted advertisements may also be active objects containing various user-selectable options. For example, a targeted advertisement may allow the user to request that additional information  
20   on a product be mailed to the user's home, may allow the user to purchase a product, or may allow the user to view additional information on a product using the program guide.

          Targeted actions that may be taken in the  
25   program guide include setting program reminders and offering a pay-per-view program for purchase. For example, if the program guide determines that the user is interested in sports programming, the program guide may automatically set a program reminder for a  
30   particular sports program. Alternatively, the program guide could provide the user with an opportunity to set

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such a reminder, but would not set the reminder automatically. Another targeted action that may be taken involves presenting the user with an option to purchase a pay-per-view event. For example, if it is  
5 determined that a user has an interest in boxing, the program guide may present the user with an opportunity to purchase a pay-per-view boxing event.

The targeted advertisements that are presented and the targeted actions that are taken in  
10 the program guide may be monitored using a special monitoring version of the program guide. The monitoring version of the program guide may be distributed to a representative group of users. Periodically, the monitoring version of the program  
15 guide transmits data relating to the frequency with which certain advertisements are displayed and actions are taken to a central facility for analysis.

Further features of the invention, its nature and various advantages will be more apparent from the  
20 accompanying drawings and the following detailed description of the preferred embodiments.

#### Brief Description of the Drawings

FIG. 1 is a diagram of a system in which an interactive television program guide is implemented in  
25 accordance with the present invention.

FIG. 2 is a diagram of a system similar to the system of FIG. 1 showing how servers may be located at network nodes in accordance with the present invention.

30 FIG. 3 is a flow chart of steps involved in determining a user's interests and displaying targeted

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advertising or taking a targeted action in the program guide in accordance with the present invention.

FIG. 4 is a depiction of an illustrative screen for a browse feature in accordance with the  
5 present invention.

FIG. 5 is a depiction of an illustrative set reminder screen in accordance with the present invention.

FIG. 6 is a depiction of an illustrative  
10 reminder screen in accordance with the present invention.

FIG. 7 is a depiction of an illustrative by time program listings screen in accordance with the present invention.

FIG. 8 is a depiction of an illustrative  
15 select start time screen in accordance with the present invention.

FIG. 9 is a depiction of an illustrative order review screen in accordance with the present  
20 invention.

FIG. 10 is a depiction of an illustrative targeted pay-per-view ordering screen in accordance with the present invention.

FIG. 11 is a depiction of an illustrative  
25 targeted set reminder screen in accordance with the present invention.

FIG. 12 is a depiction of an illustrative navigator screen containing a targeted advertisement in accordance with the present invention.

FIG. 13 is a depiction of an illustrative by  
30 channel program listings screen in accordance with the present invention.

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FIG. 14 is a depiction of an illustrative program promotion screen in accordance with the present invention.

FIG. 15 is a depiction of an illustrative pay-per-view movie screen and an illustrative corresponding pay-per-view information screen in accordance with the present invention.

FIG. 16 is a diagram of an illustrative monitoring process in accordance with the present invention.

FIG. 17 is a depiction of an illustrative television screen containing a flip region in accordance with the present invention.

FIG. 18 is a depiction of an illustrative navigator screen containing a selectable targeted advertisement in accordance with the present invention.

FIG. 19 is a depiction of an illustrative movie listings screen in accordance with the present invention.

FIG. 20 is a depiction of an illustrative movie information screen in accordance with the present invention.

FIG. 21 is a depiction of an illustrative pay-per-view movies listings screen in accordance with the present invention.

FIG. 22 is a depiction of an illustrative arrangement for displaying an advertisement on top of a currently displayed television channel in accordance with the present invention.

FIG. 23 is a flow chart showing steps involved in an illustrative approach for displaying an

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advertisement over a selected program in accordance with the present invention.

FIG. 24 is a depiction of an illustrative targeted advertisement presented in the form of an active object in accordance with the present invention.

FIG. 25 is a flow chart of steps involved in an illustrative approach for displaying relatively small advertisements that the user may select to view additional information in the form of a full-screen video advertisement in accordance with the present invention.

FIG. 26 is a diagram of a data structure that may be used to identify the content of targeted advertisements or actions in accordance with the present invention.

FIG. 27 is a diagram of a data structure that may be used to identify the content of television programs in accordance with the present invention.

FIG. 28 is a flow chart showing steps involved in monitoring which targeted advertisements are displayed to the user and which targeted actions are taken in the program guide in accordance with the present invention.

FIG. 29 is a schematic diagram of a data record of a type suitable for collecting monitoring data in accordance with the present invention.

#### Detailed Description of the Preferred Embodiments

An illustrative program guide system 30 in accordance with the present invention is shown in FIG. 1. Main facility 32 contains a program guide database 34 for storing program guide information such

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as television program guide listings data, pay-per-view ordering information, television program promotional information, etc. Main facility 32 also contains an advertising database 36 for storing advertising  
5 information. Information from databases 34 and 36 may be transmitted to television distribution facility 38 via communications link 40. Link 40 may be a satellite link, a telephone network link, a cable or fiber optic link, a microwave link, a combination of such links, or  
10 any other suitable communications path. If it is desired to transmit video signals (e.g., for advertising and promotional videos) over link 40 in addition to data signals, a relatively high bandwidth link such as a satellite link is generally preferable  
15 to a relatively low bandwidth link such as a telephone line.

Television distribution facility 38 is a facility for distributing television signals to users, such as a cable system headed, a broadcast distribution  
20 facility, or a satellite television distribution facility.

The program guide information transmitted by main facility 32 to television distribution facility 38 includes television program listings data such as  
25 program times, channels, titles, descriptions, etc. Transmitted program information also includes pay program data such as pricing information for individual programs and subscription channels, time windows for ordering programs and channels, telephone numbers for  
30 placing orders that cannot be impulse ordered, etc. The advertising information transmitted by main facility 32 to television distribution facility 38

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includes text, graphics, and video advertisements for various products and services. If desired, some of the program guide and advertising information may be provided using data sources at facilities other than  
5 main facility 32. For example, data related to pay program order processing (e.g., billing data and the like) may be generated by an order processing and billing system that is separate from main facility 32 and separate from television distribution facility 38.  
10 Similarly, advertising information may be generated by an advertising facility that is separate from main facility 32 and television distribution facility 38.

Regardless of its source, advertising information may be maintained on a server 42 within  
15 television distribution facility 38 if desired. Server 42 may be capable of handling text, graphics, and video.

Television distribution facility 38 distributes program guide and advertising information  
20 to the user television equipment 44 of multiple users via communications paths 46. Program guide data may be distributed over an out-of-band channel on paths 46. Advertising information may be distributed using any of a number of suitable techniques. For example, text and  
25 graphics advertisements may be distributed over an out-of-band channel using an out-of-band modulator. Video advertisements may also be distributed in this way, although large quantities of video information may be more efficiently distributed using one or more digital  
30 channels on path 46. Such digital channels may also be used for distributing text and graphics.

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Each user has a receiver, which is typically a set-top box such as set-top box 48, but which may be other suitable television equipment into which circuitry similar to set-top-box circuitry has been  
5 integrated. Program guide data is distributed to set-top boxes 48 periodically. Television distribution facility 38 may also poll set-top boxes 48 periodically for certain information (e.g., pay program account information or information regarding programs that have  
10 been purchased and viewed using locally-generated authorization techniques). Main facility 32 preferably contains a processor to handle information distribution tasks. Each set-top box 48 preferably contains a processor to handle tasks associated with implementing  
15 a program guide application on the set-top box 48. Television distribution facility 38 may contain a processor for tasks associated with monitoring a user's interactions with the interactive program guide implemented on set-top boxes 48 and for handling tasks  
20 associated with the distribution of program guide and advertising information.

Each set-top box 48 is typically connected to an optional videocassette recorder 50 so that selected television programs may be recorded. Each  
25 videocassette recorder 50 is connected to a television 52. To record a program, set-top box 48 tunes to a particular channel and sends control signals to videocassette recorder 50 (e.g., using an infrared transmitter) that direct videocassette recorder 50 to  
30 start and stop recording at the appropriate times.

During use of the interactive television program guide implemented on set-top box 48, television



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program listings may be displayed on television 52. Each set-top box 48, videocassette recorder 50, and television 52 may be controlled by one or more remote controls 54 or any other suitable user input interface  
5 such as a wireless keyboard, mouse, trackball, dedicated set of buttons, etc.

Communications paths 46 preferably have sufficient bandwidth to allow television distribution facility 38 to distribute scheduled television  
10 programming, pay programming, advertising and other promotional videos, and other video information to set-top boxes 44 in addition to non-video program guide and advertising data. Multiple television and audio channels (analog, digital, or both analog and digital)  
15 may be provided to set-top boxes 48 via communications paths 46. If desired, program listings and advertising information may be distributed by one or more distribution facilities that are similar to but separate from television distribution facility 38 using  
20 communications paths that are separate from communications paths 46.

Certain functions such as pay program purchasing and the remote monitoring of certain users' interactions with the program guide may require set-top  
25 boxes 48 to transmit data to television distribution facility 38 over communications paths 46. If desired, such data may be transmitted over telephone lines or other separate communications paths. If functions such as these are provided using facilities separate from  
30 television distribution facility 38, some of the communications involving set-top boxes 48 may be made directly with the separate facilities.

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A number of suitable techniques may be used to distribute advertising videos. For example, if each path 46 includes a number of traditional analog television channels, one or more of these channels may  
5 be used to support a number of digital channels. The bandwidth of each analog channel that is used to support digital channels may support ten or more of such digital channels. If desired, videos may be provided from server 42 in a continuously looped  
10 arrangement on these digital channels. Information provided to set-top box 48 may then be used to determine which digital channels to tune to when it is time to display a desired video. Alternatively, videos may be provided on demand. With this approach, set-top  
15 box 48 and server 42 negotiate to determine a channel on which to provide the desired video. Videos that originate from main facility 32 or a separate facility are preferably distributed to user television equipment 44 using these or other suitable techniques.

20 As shown in FIG. 2, the capabilities of server 42 may be provided using servers 56 located at network nodes 58. Servers such as servers 56 may be used instead of server 42 or may be used in conjunction with a server 42 located at television distribution  
25 facility.

Graphics information for advertisements may be downloaded periodically (e.g., once per day) to set-top boxes 48 of FIG. 1 and stored locally. The graphics information may be accessed locally when  
30 needed by the program guide implemented on set-top box 48. Alternatively, graphics information may be provided in a continuously-looped arrangement on one or

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more digital channels on paths 46. With such a continuously-looped arrangement, a map indicating the location of the latest graphics information is preferably downloaded periodically to set-top boxes 48  
5 (e.g., once per day). This allows the content on the digital channels to be updated. The program guides on set-top boxes 48 may use the map to locate desired graphics information on the digital channels. Another approach involves using a server such as server 42 or  
10 servers 56 (FIG. 2) to provide the graphics information after a set-top box 48 and that server have negotiated to set up a download operation. A bitmap or other suitable set of graphics information may then be downloaded from the server to the set-top box. If  
15 desired, the server may download instructions informing the set-top box where the desired graphics information can be located on a particular digital channel. The graphics information can be updated periodically if the server that is responsible for downloading the  
20 instructions for informing the set-top box of the location of the graphics information is also updated periodically.

Text information for advertisements may be provided to set-top boxes 48 using the same paths that  
25 are used for distributing program guide data. For example, advertising data from database 36 of FIG. 1 may be provided to set-top boxes 48 using link 40, television distribution facility 38, and paths 46. The text information may be stored locally in set-top boxes  
30 48 and updated periodically (e.g., once per day).

Text information, graphics information, and videos for advertisements may also be distributed using

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a combination of these techniques or any other suitable technique.

Advertising information (whether video, graphics, text, or a combination of video, graphics, and text) is presented to the user based on the user's interactions with the program guide that are indicative of the user's interests. Moreover, various actions may be taken in the program guide in addition to or as an alternative to displaying such targeted advertising.

10 For example, a reminder for a particular program may be set automatically by the program guide when the program guide determines from the user's behavior that the user is interested in that type of program.

As shown in FIG. 3, the program guide

15 determines the user's interests by monitoring the user's interactions with the program guide at step 60. Any input the user makes with remote control 54 of FIG. 1 or other user input device may be monitored. At step 62, advertising targeted to the user is displayed on

20 the display screen of television 52 in user television equipment 44 based on the user's interests that were identified at step 60. At step 64, a targeted action is taken in the program guide based on the user's interests that were identified at step 60. Examples of

25 suitable targeted program guide actions that may be taken include setting a reminder for a particular program or offering the user an opportunity to purchase a particular pay-per-view program. If desired, the program guide may both display targeted advertising

30 (step 62) and take a suitable targeted action based on the user's interests (step 64).

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The steps of FIG. 3 are preferably performed by the program guide implemented on each of set-top boxes 48 in FIG. 1. Certain functions (particularly the display of graphics or videos) may also involve the use of resources located at main facility 32 and television distribution facility 38 and other such facilities. If desired, some of the steps of FIG. 3 may be performed using an application running on set-top boxes 48 other than the interactive program guide. For clarity, the principles of the invention are described in the context of an arrangement in which the set-top-based steps of FIG. 3 are performed primarily using an interactive program guide.

In addition to performing the steps of FIG. 3, a suitable interactive program guide typically provides various features for displaying television program listings information to the user. For example, if the user presses the appropriate buttons on remote control 54, the user may be presented with a time-ordered or channel-ordered grid or table of program guide listings, etc.

An example of a program guide feature that may be used for browsing television program listings one at a time is shown in FIG. 4. The user watches television (e.g., channel 9 in the example of FIG. 4) on television display screen 66. When the user presses a suitable button on remote control 54 of FIG. 1 (e.g., an up or down cursor key), browse display region 68 is presented. Browse display region 68 contains information on available television programs. In the example of FIG. 4, browse display region 68 indicates that the program "Holiday Entertaining" is scheduled to

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be broadcast (i.e., televised via cable, satellite, or traditional over-the-air broadcasting) on channel 10 at 10:00 AM. The user can view information regarding the programming on other channels by pressing up or down  
5 cursor keys to change the browse channel 69 and may view information regarding the programming at different scheduled broadcast times by pressing left or right cursor keys to change the browse time 71. As the user browses for information on television programs  
10 appearing on different television channels and at various broadcast times, the television channel to which the user is tuned (channel 9 in the example of FIG. 4) does not change. Browse display region 68 may contain a targeted advertisement 70 that is targeted to  
15 the user based on the user's interests as determined from the user's interactions with the program guide.

Another feature that may be provided is a "reminders" feature. The reminders features allows the user to set a reminder for a television program that  
20 the user wishes to watch at a later time. Just before the television program for which a reminder has been set is to be broadcast, a reminder message is displayed on the user's television screen.

For example, if the user presses an  
25 appropriate button (e.g., an "OK" button) after having used the browse feature to navigate to the program listing for "Holiday Entertaining" shown in FIG. 4, the user is presented with set reminder screen 72 of FIG. 5. Set reminder screen 72 allows the user to set  
30 a reminder for the selected program 74 (Holiday Entertaining) by selecting yes option 76 with highlight region 78. If the user selects no option 80, set

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reminder screen 72 is canceled. Set reminder screen 72 may contain an advertisement 82 having content that is targeted to the user based on the user's interactions with the program guide. Set reminder screen 72 and  
5 other such screens in the program guide may use either a full-screen or partial-screen display format.

A short while before the scheduled broadcast time of the program for which a reminder has been set, the program guide displays a reminder display region 84  
10 on reminder screen 85, as shown in FIG. 6. Reminder display region 84 may be displayed over the currently displayed television channel (e.g., channel 9). In the example of FIG. 6, two reminders were set for the 10:00 AM time slot. As a result, reminder display region 84  
15 contains program listings for both selected programs. The user may automatically tune to one of the selected programs by moving highlight region 86 from hide reminders option 88 to program listing 90 or program listing 92. When the user presses the "OK" button,  
20 set-top box 48 tunes to the channel of the selected program. If the user selects hide reminders option 88, reminder display region 84 is hidden from view. Reminder display region 84 may contain an advertisement 94 that is targeted to the user based on the user's  
25 interests as determined from the user's interactions with the program guide.

A program guide display feature that allows a user to review program listings for multiple channels for a particular broadcast time is the "by time"  
30 listings feature. If the user opts to view program listings arranged by time (e.g., by pressing the appropriate buttons to navigate through various menu

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options presented by the program guide), the program guide displays by time listings screen 96 of FIG. 7. The user may select a particular time slot 98 that is of interest (e.g., using the left and right cursors).

5 Program listings 100 that are available for the selected time slot are displayed in a channel-ordered list. If additional information is available for a particular program, information icon 102 may be displayed with the listing of that program. By time  
10 listings screen 96 may contain an advertisement 104 that is targeted to the user based on the user's interests as determined from the user's interactions with the program guide.

The program guide may display similar program  
15 listings screens for various other types of program listings display formats. For example, all programs for a particular channel may be displayed or all programs in a particular category (e.g., sports, movies, etc.) may be displayed.

20 If a user selects a pay-per-view program for ordering from such a display, the program guide displays a pay-per-view ordering page. For example, if the user selects the program entry "Volcano" from the list of programs in FIG. 7, the program guide displays  
25 pay-per-view ordering screen 106 of FIG. 8. Pay-per-view ordering screen 106 allows the user to view information on the channel 108 on which the program is scheduled to be broadcast, the rating 110, the price 112, and various available broadcast times 114, 116,  
30 and 118. A cancel option 120 allows the user to cancel pay-per-view ordering. The user may select cancel option 120 or a given broadcast time 114, 116, or 118



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by placing highlight region 122 on top of the desired option and pressing "OK." Pay-per-view ordering screen 106 may contain an advertisement 124 that is targeted to the user based on the user's interests as determined  
5 from the user's interactions with the program guide.

After the user selects a desired broadcast time from pay-per-view ordering screen 106 of FIG. 7, order review screen 126 of FIG. 9 is presented. Order review screen 126 provides the user with information on  
10 the program and its selected broadcast time and allows the user to cancel (with option 128) or confirm (with option 130) the order. If the order is confirmed, the selected pay-per-view program will be provided to the user at the scheduled broadcast time. Order review  
15 screen 126 may contain an advertisement 132 that is targeted to the user based on the user's interests as determined by the user's interactions with the program guide.

If desired, targeted actions may be taken in  
20 the program guide based on a determination of the user's interests from the user's interactions with the program guide. For example, the program guide may offer the user an opportunity to purchase a particular pay-per-view program. If the user's interactions with  
25 the program guide indicate that the user is interested in movies of the same type as the movie "Volcano," a targeted pay-per-view ordering screen such as targeted pay-per-view ordering screen 134 of FIG. 10 may be presented. Screen 134 provides the user with an  
30 opportunity to order the movie "Volcano" by selecting tell me more option 136 with highlight 138. Selecting tell me more option 136 allows additional information

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on the content and available broadcast times of the movie to be provided to the user. The user can cancel screen 134 by selecting no option 140. Targeted pay-per-view ordering screen 134 may contain a targeted advertisement 142. If desired, targeted pay-per-view ordering screen 134 may be provided as a partial-screen display overlaid on top of the current television program being watched by the user.

Another type of targeted action that may be taken by the program guide based on a determination of the user's interests involves offering the user an opportunity to set a reminder for a particular television program. For example, if it is determined that a user is interested in television programs such as the program "Seinfeld," then a targeted set-reminders screen such as targeted set reminders screen 146 of FIG. 11 may be displayed. Targeted set reminders screen 146 is automatically presented to the user by the program guide so that the user may set a reminder for "Seinfeld." Targeted set reminders screen 146 may contain a program information display region 148 that contains information such as a program description, ratings information, etc. Targeted set reminders screen 146 may also contain a targeted advertisement 150. The user may cancel targeted set reminders screen 146 by selecting no option 152. The user may set the reminder by selecting yes option 154. If desired, targeted set reminders screen 146 may be presented as a partial-screen display on top of the television channel currently being watched by the user.

A number of different approaches may be used to monitor the user's interactions with the program

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guide. Every action that the user takes (e.g., every button that is pressed on remote control 54 of FIG. 1 and every corresponding menu option selected by the viewer) may be monitored. The amount of information  
5 about the user's interests that the program guide derives from the user's actions depends on the amount of resources it is desired to expend on processing this information. If it is desired to obtain the maximum possible amount of information about the user's  
10 interests, every keystroke of the user may be monitored. If such detailed monitoring of the user's actions is too burdensome on the processing capabilities of the program guide, the program guide can be used to monitor a more limited range of the  
15 user's actions.

An example of a type of user interaction with the program guide that may be used to determine the user's interests is the user's interactions with the program guide's navigation features. An illustrative  
20 program guide navigator is shown in FIG. 12. When the user invokes the program guide navigator, the program guide displays navigator screen 152. (A targeted advertisement 154 may be displayed if desired.) The navigator contains user-selectable options arranged in  
25 columns under various headings 156. For example, under a suitable logo, the user may be presented with program listings arrangement options 158. If the user selects a category option such as movies option 160, sports option 162, children option 164, or uses search  
30 function 166 to locate programs based on such category information, the program guide can determine that the user is interested in that particular type of service

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and can present targeted advertising or take a targeted action in the program guide based on that interest. If the user selects by time option 168 and views the program listings for a particular time, the program  
5 guide can determine that the user is interested in programming that is scheduled to be broadcast at about that time.

If the user selects by channel option 170 and views information for a particular channel, the program  
10 guide can determine that the user is interested in programming that will appear on that channel. An illustrative display screen for by channel option 170 is shown in FIG. 13. By channel screen 172 contains program listings 174 for a selected channel 176. The  
15 user can select other channels for which television program guide information is to be displayed using cursor keys. In by channel screen 172, the user has decided to view program listings for the channel "HBO." The program guide can determine that the user is  
20 interested in programming for HBO by monitoring whether the user scrolls through the program listings for HBO (e.g., using cursors on the remote control). If desired, a targeted advertisement 178 may be displayed on by channel screen 172.

25 If it is determined that the user is interested in a particular channel (e.g., because the user has scrolled through the listings for that channel and paused for a period of time), the program guide can present appropriate targeted advertising or take an  
30 appropriate targeted action in the program guide accordingly. For example, as shown in FIG. 14, the program guide may present a program promotion screen

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180 to promote a program that is available on the HBO channel based on the knowledge that the user is interested in television programming on the HBO channel from the user's interaction with the by channel program listings on screen 172 of FIG. 13. Program promotion screen 180 may contain program information 182 and a targeted advertisement 184. If the user selects no option 186, program promotion screen 180 may be cancelled. If the user selects yes option 188, the user may be presented with the opportunity to view more information on the program, set a reminder, etc.

Program promotion screen 180 is an example of an arrangement in which the targeted advertising is presented in the form of an active object. When the user selects an active object (e.g., as when selecting options 186 or 188 in FIG. 14 or otherwise clicking on or indicating a desire to invoke the active object), a suitable action may be taken. The type of action taken by the program guide when the active object is selected depends on the nature of the advertisement. For example, if the active object relates to an advertisement for a product, the user may be presented with options for requesting that information be mailed to the user's home, purchasing the product, or viewing additional product information.

As shown in FIG. 15, if the user views information on pay-per-view movies using pay-per-view movie screen 190, the user may use a highlight to select a desired program listing 192 for which more information is to be provided. An information icon 194 may be used to indicate the availability of such additional information.

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Additional information on the selected program may be displayed using pay-per-view program information screen 196, which may contain a program description 198 and a targeted advertisement 200. One  
5 way that the program guide can determine a user's interests is by observing when the user requests such additional information. For example, if the user asks for additional information on the movie Dante's Peak, the program guide may determine that the user is  
10 interested in movies and, more particularly, movies of the same type as Dante's Peak.

The program guide may monitor the user's interactions using sequential processes, concurrently running processes, processes involving both sequential  
15 and concurrent monitoring, or any other suitable processes implemented on set-top box 48 of FIG. 1 or comparable user television equipment. FIG. 16 is a block diagram illustrating some of the processes that may be used when monitoring the user's interactions  
20 with the program guide. Process 202 determines if the user has watched a given television program for more than a certain amount of time (e.g., 10 minutes). If the user watches more than this threshold amount, the program guide may assume that the user is relatively  
25 interested in subject matter related to the subject matter of the program. Process 204 determines whether a reminder has been set for a given program. If the user sets a reminder, the program guide may assume that the user is interested in subject matter similar to  
30 that of the program for which the reminder was set. In process 206, it is determined whether the user has taken steps toward purchasing or has actually purchased

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a program. Process 208 involves determining whether a user has taken steps toward recording a program. Such steps may be taken by selecting certain program recording menu options presented by the program guide.

5 Process 210 determines whether the user has selected certain categories of programs of interest (e.g., from a navigator menu such as navigator screen 152 of FIG. 12). Process 212 determines whether the user has viewed information on programs that are scheduled to be

10 broadcast at a particular time (e.g., using the by time option of the navigator of FIG. 12). Process 214 determines whether the user has viewed information on programs that are scheduled to be broadcast on a particular channel (e.g., using the by channel option

15 of the navigator of FIG. 12). Process 216 determines whether the user has defined favorites or other preferences indicative of the user's interests. If desired, the program guide may allow each user to establish a profile of various favorite settings and

20 other criteria, as described in commonly-assigned concurrently-filed Ellis et al. U.S. patent application No. 09/034,934, which is hereby incorporated by reference herein. With such an approach, users may establish profiles of preferences

25 such as their favorite channels, preferred genres of programming (sports, comedy, etc.), favorite actors, desired or required ratings, etc. If one of these favorites settings relates to sports, for example, the program guide can use that information to present

30 targeted advertising on sports products or to present the user with an opportunity to purchase a pay-per-view sporting event, etc. The program guide may present

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targeted advertising or take a targeted program guide action based on any of the preferences defined by the user, a suitable combination of such preferences, etc.

The processes illustrated as part of the  
5 monitoring process 218 of FIG. 16 are illustrative only. Any other suitable process for monitoring the interests of the user based on the user's interactions with the program guide may be used if desired.

If desired, targeted advertising may be  
10 presented as part of a program guide "flip" feature, as shown in FIG. 17. The flip feature of FIG. 17 allows the user to view television program listings information for the television program to which the set-top box 48 is currently tuned. For example, flip  
15 display region 220 contains a program listing 222 for the program 224 that is currently being displayed on television screen 225. A targeted advertisement 227 may be displayed at a suitable location in flip display region 220.

20 As shown in FIG. 18, a targeted advertisement such as targeted advertisement 226 may be an active object that presents the user with an opportunity to take an action in the program guide such as setting a reminder, ordering a pay-per-view event, etc. If the  
25 user selects targeted advertisement 226, the program guide presents the user with a suitable set reminders screen. FIG. 18 also illustrates how such a targeted advertisement may be presented as part of navigator screen 228 if desired.

30 Another location for presenting a targeted advertisement is on a movie listings screen such as movie listings screen 229 of FIG. 19. Targeted



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advertisement 230, may be, for example, an advertisement for a current movie available on a pay-per-view channel or an advertisement on another movie-related subject.

5           If additional information is available for a given movie, the listing for that movie may be provided with an information icon 232. If the user selects a movie for which additional information is available such as movie 234, the user may be presented with a  
10 movie information screen such as movie information screen 236 of FIG. 20. In movie information screen 236, information is presented on the scheduled broadcast times of the movie, the movie title, and a description of the movie. In addition, a targeted  
15 advertisement 238 may be presented. If desired, a targeted video advertisement 240 may be provided to display video clips from the selected movie, related promotional videos, or other suitable videos.

FIG. 21 shows how a targeted advertisement  
20 242 may be presented as part of a pay-per-view movies listings screen 244. It may be desirable for targeted advertisement 242 to contain information on pay-per-view movies, because the user has expressed an interest in such movies by navigating to pay-per-view listings  
25 screen 244. Another suitable targeted advertisement might use information on the user's interest in children's programming to present an advertisement for a children's movie.

If desired, a targeted advertisement 246 may  
30 be displayed over a currently displayed television program 248, as shown in FIG. 22. Such a targeted advertisement may be presented to the user for a fixed

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time period (e.g., 5 to 10 seconds) or may require the user to actively clear the display (e.g., by pressing a key on the remote control). Targeted advertisement 246 may be presented at a time that is determined to be particularly effective, such as just before a purchased pay-per-view event is to begin or just before a program for which a user set a reminder is to be broadcast.

An example of an approach for displaying a targeted advertisement just before a selected program is to be aired is illustrated in the flow chart of FIG. 23. In the approach of FIG. 23, the user sets a reminder for a desired program at step 250. At step 252, the program guide displays a reminder on the user's display screen. The user may select a program from the list of one or more programs contained in the reminder list at step 254. At step 256, the program guide automatically tunes the set-top box to the channel for the selected program and displays an advertisement overlaid on top of the program currently on that channel. If desired, the advertisement may be a targeted advertisement of the type shown in FIG. 22 (or a full-screen equivalent). Alternatively, as shown in FIG. 24, a targeted advertisement 258 may be provided in the form of an active object containing targeted product information 260, selectable purchase option 262, and additional information option 264. If the user chooses selectable purchase option 262, the program guide or another appropriate service implemented on set-top box 48 provides the user with an opportunity to purchase the advertised product (and, if desired, related or unrelated products). If the user

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selects additional information option 264, the user may be provided with additional product information.

A related approach is illustrated in the flow chart of FIG. 25. After the program guide displays a relatively small targeted advertisement on a portion of the user's display screen at step 266, the user may use the remote control to highlight or otherwise select the displayed advertisement at step 268. The program guide then displays an associated full-screen advertisement with video at step 270.

Data structures that may be used to identify the content of targeted advertisements or actions and television programs are shown in FIGS. 26 and 27. As shown in FIG. 26, advertisements or actions such as advertisement or action 272 have associated attribute tags 274, 276, 278, and 280. Channel tags 274 identify which channels relate to the subject matter of advertisement or action 272. For example, if advertisement or action 272 is an advertisement for athletic footwear, channel tags 274 might include the channel identifier information for one or more sports channels. Broadcast time tags 276 identify certain broadcast times which are associated with the subject matter of the advertisement. For example, advertisements for breakfast foods might be associated with time slots in the morning and advertisements for dinner foods might be associated with time slots in the evening. Category tags 278 contain information relating to genres or themes to which the advertisement relates. For example, an advertisement for athletic footwear or a sports-oriented magazine might be associated with the theme "sports" and popcorn might be

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associated with the theme "movies." Program tags 280 provide information related to specific programs with which the advertisement or action is to be associated. For example, an advertisement for athletic footwear  
5 might be associated with the program "Wide World of Sports."

Programs also generally have associated attribute tags, as shown in FIG. 27. Program 282 has one or more associated channel tags 284, one or more  
10 broadcast time tags 286, and one or more category tags 288. Channel tags 284 identify the channels associated with program 282 (i.e., the channels on which program 282 is broadcast). Broadcast time tags 286 identify the broadcast times of program 282. Category tags 288  
15 identify the genres with which program 282 is associated (e.g., sports, movies, comedies, children's programming, etc.).

Information concerning which advertisements are viewed by users and which targeted actions are  
20 taken in the program guide is important for evaluating the effectiveness of such measures, setting advertising rates, analyzing viewing patterns, etc. Steps involved in monitoring which targeted advertisements are displayed and which targeted actions are taken in the  
25 program guide are shown in FIG. 28. At step 290, a cable system operator or other service provider deploys a special monitoring version of the program guide to a statistically sampled subset of subscribers. All subscribers may be provided with such a monitoring  
30 version of the program guide if desired. However, providing complete coverage may not be necessary to obtain accurate information and may be unnecessarily

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burdensome. The special version of the program guide may be deployed by electronically downloading the new version to selected subscribers, replacing the subscribers' set-top boxes with special preprogrammed  
5 boxes, or any other suitable technique.

At step 292, the program guides collect information on which targeted advertisements are actually displayed on the user's television and which targeted actions are actually taken in the program  
10 guide. The monitoring that takes place during step 292 may occur over a number of days or any other suitable time period. At step 294, each monitoring version of the program guide transmits its information to a central facility (e.g., a facility such as television  
15 distribution facility 38 of FIG. 1, main facility 32 of FIG. 1, or some other such suitable facility). Data may be transmitted to the central facility via the return path in a two-way cable link, via modem link, or via any other suitable communications path. Data may  
20 be transmitted periodically or when a data transfer is requested from the central facility. The information collected at the central facility is analyzed at step 296. The data analysis may reveal, for example, that certain targeted advertisements are more often viewed  
25 than others and that certain targeted program guide actions are taken more often than others. Analysis may also reveal information about the interests of the users.

A data record of a type suitable for  
30 collecting the monitoring data is shown in FIG. 29. Each such monitoring record 298 may contain an advertisement or action identifier 300 that identifies

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which advertisement was displayed or which action was taken, date and time information 302 on when the advertisement was displayed or action taken, location information 304 specifying where in the program guide the advertisement was displayed or action taken, and information 306 on the reasons the program guide displayed the advertisement or took the action. The data record format of FIG. 29 is illustrative only. Any other suitable type of data record may be used if desired.

The foregoing is merely illustrative of the principles of this invention and various modifications can be made by those skilled in the art without departing from the scope and spirit of the invention.

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What is Claimed is:

1. A system in which an interactive television program guide is implemented on user television equipment comprising:

means for monitoring a user's interactions with the interactive television program guide to determine the user's interests; and

means for presenting targeted advertising to the user with the interactive television program guide based on the user's interests.

2. The system defined in claim 1 wherein the means for presenting further comprises means for presenting targeted advertising that contains text.

3. The system defined in claim 1 wherein the means for presenting further comprises means for presenting targeted advertising that contains graphics.

4. The system defined in claim 1 wherein the means for presenting further comprises means for presenting targeted advertising that contains video.

5. The system defined in claim 1 further comprising a set-top box on which the interactive television program guide is implemented.

6. The system defined in claim 1 further comprising:

a television distribution facility for distributing television programming to the user television equipment; and

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a video server located in the television distribution facility for providing targeted advertisements containing video.

7. The system defined in claim 1 further comprising:

a television distribution facility for distributing television programming to the user television equipment;

a plurality of network nodes for use in providing the television programming to the user television equipment; and

video servers located at some of the networks nodes for providing targeted advertisements containing video.

8. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a browse display region that contains a targeted advertisement.

9. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a set reminders screen that contains a targeted advertisement.

10. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a reminders screen that contains a targeted advertisement.



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11. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a by time screen that contains a targeted advertisement.

12. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a select start time pay-per-view purchasing screen that contains a targeted advertisement.

13. The system defined in claim 1 wherein the means for presenting further comprises means for displaying an order review screen that contains a targeted advertisement.

14. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a targeted pay-per-view ordering screen that contains a targeted advertisement.

15. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a targeted set reminders screen that contains a targeted advertisement.

16. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a navigator screen that contains a targeted advertisement.

17. The system defined in claim 1 further comprising means for displaying a by channel program

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listings screen that contains program listings for a particular channel and that contains a targeted advertisement.

18. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a program promotion screen that contains a targeted advertisement.

19. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a pay-per-view program information screen that contains a targeted advertisement.

20. The system defined in claim 1 wherein the means for monitoring further comprises means for determining whether the user has watched a given television program for more than a predetermined time.

21. The system defined in claim 1 wherein the means for monitoring further comprises means for determining whether a reminder has been set by the user for a particular program.

22. The system defined in claim 1 wherein the means for monitoring further comprises means for determining whether the user has taken steps toward purchasing a particular program.

23. The system defined in claim 1 wherein the means for monitoring further comprises means for

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determining whether the user has purchased a particular program.

24. The system defined in claim 1 wherein the means for monitoring further comprises means for determining whether the user has taken steps toward recording a particular program.

25. The system defined in claim 1 wherein the means for monitoring further comprises means for determining whether the user has selected certain categories of programs of interest.

26. The system defined in claim 1 wherein the means for monitoring further comprises means for determining whether the user has viewed information on programs scheduled to be broadcast at a particular time.

27. The system defined in claim 1 wherein the means for monitoring further comprises means for determining whether the user has viewed information on programs scheduled to be broadcast on a particular channel.

28. The system defined in claim 1 wherein the means for monitoring further comprises means for determining whether the user has defined user preferences in the program guide that are indicative of the user's interests.

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29. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a flip display region that contains a targeted advertisement.

30. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a navigator screen that contains a prompt for setting a reminder for a program that the system has automatically selected based on the user's interests.

31. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a movie listings screen that contains a targeted advertisement.

32. The system defined in claim 1 wherein the means for presenting further comprises means for presenting a movie information screen that contains a video advertisement.

33. The system defined in claim 1 wherein the means for presenting further comprises means for presenting a movie information screen that contains a video advertisement and a targeted advertisement.

34. The system defined in claim 1 wherein the means for presenting further comprises means for presenting a pay-per-view movies listings screen that contains a targeted advertisement.

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35. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a targeted advertisement over a currently-displayed television program.

36. The system defined in claim 1 further comprising:

means for allowing the user to set a reminder for a program;

means for displaying a targeted advertisement on top of the program for which the reminder was set;

means for providing the user with an opportunity to request additional information related to the displayed targeted advertisement; and

means for displaying additional information related to the displayed targeted advertisement when the user requests more information.

37. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a targeted advertisement that is an active object.

38. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a targeted advertisement to the user that contains targeted product information.

39. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a targeted advertisement to the user that

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contains targeted product information and an associated selectable purchase option.

40. The system defined in claim 1 wherein the means for presenting further comprises means for displaying a targeted advertisement to the user that contains targeted product information and an associated additional information option.

41. The system defined in claim 1 wherein the means for presenting further comprises:

means for displaying a relatively small targeted advertisement to the user;

means for allowing the user to select the displayed relatively small targeted advertisement; and

means for displaying a corresponding substantially full-screen targeted advertisement containing video to the user when the user selects the displayed relatively small targeted advertisement.

42. The system defined in claim 1 further comprising means for providing the targeted advertising with attribute tags.

43. The system defined in claim 1 further comprising means for providing the targeted advertising with channel tags.

44. The system defined in claim 1 further comprising means for providing the targeted advertising with broadcast time tags.

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45. The system defined in claim 1 further comprising means for providing the targeted advertising with program tags.

46. A method for displaying targeted advertising using an interactive television program guide implemented on user television equipment, comprising the steps of:

monitoring a user's interactions with the interactive television program guide to determine the user's interests; and

presenting targeted advertising to the user with the interactive television program guide based on the user's interests.

47. The method defined in claim 46 wherein the step of presenting further comprises the step of presenting targeted advertising that contains text.

48. The method defined in claim 46 wherein the step of presenting further comprises the step of presenting targeted advertising that contains graphics.

49. The method defined in claim 46 wherein the step of presenting further comprises the step of presenting targeted advertising that contains video.

50. The method defined in claim 46 further comprising the step of providing the interactive television program guide using a set-top box.

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51. The method defined in claim 46 further comprising the steps of:

distributing television programming to the user television equipment with a television distribution facility; and

providing targeted advertisements containing video using a video server located in the television distribution facility.

52. The method defined in claim 46 further comprising the steps of:

distributing television programming to the user television equipment with a television distribution facility;

providing the television programming to the user television equipment using a plurality of network nodes; and

providing targeted advertisements containing video using video servers located at some of the networks nodes.

53. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a browse display region that contains a targeted advertisement.

54. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a set reminders screen that contains a targeted advertisement.



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55. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a reminders screen that contains a targeted advertisement.

56. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a by time screen that contains a targeted advertisement.

57. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a select start time pay-per-view purchasing screen that contains a targeted advertisement.

58. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying an order review screen that contains a targeted advertisement.

59. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a targeted pay-per-view ordering screen that contains a targeted advertisement.

60. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a targeted set reminders screen that contains a targeted advertisement.

61. The method defined in claim 46 wherein the step of presenting further comprises the step of

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displaying a navigator screen that contains a targeted advertisement.

62. The method defined in claim 46 further comprising the step of displaying a by channel program listings screen that contains program listings for a particular channel and that contains a targeted advertisement.

63. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a program promotion screen that contains a targeted advertisement.

64. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a pay-per-view program information screen that contains a targeted advertisement.

65. The method defined in claim 46 wherein the step of monitoring further comprises the step of determining whether the user has watched a given television program for more than a predetermined time.

66. The method defined in claim 46 wherein the step of monitoring further comprises the step of determining whether a reminder has been set by the user for a particular program.

67. The method defined in claim 46 wherein the step of monitoring further comprises the step of

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determining whether the user has taken steps toward purchasing a particular program.

68. The method defined in claim 46 wherein the step of monitoring further comprises the step of determining whether the user has purchased a particular program.

69. The method defined in claim 46 wherein the step of monitoring further comprises the step of determining whether the user has taken steps toward recording a particular program.

70. The method defined in claim 46 wherein the step of monitoring further comprises the step of determining whether the user has selected certain categories of programs of interest.

71. The method defined in claim 46 wherein the step of monitoring further comprises the step of determining whether the user has viewed information on programs scheduled to be broadcast at a particular time.

72. The method defined in claim 46 wherein the step of monitoring further comprises the step of determining whether the user has viewed information on programs scheduled to be broadcast on a particular channel.

73. The method defined in claim 46 wherein the step of monitoring further comprises the step of

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determining whether the user has defined user preferences in the program guide that are indicative of the user's interests.

74. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a flip display region that contains a targeted advertisement.

75. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a navigator screen that contains a prompt for setting a reminder for a program that has been automatically selected based on the user's interests.

76. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a movie listings screen that contains a targeted advertisement.

77. The method defined in claim 46 wherein the step of presenting further comprises the step of presenting a movie information screen that contains a video advertisement.

78. The method defined in claim 46 wherein the step of presenting further comprises the step of presenting a movie information screen that contains a video advertisement and a targeted advertisement.

79. The method defined in claim 46 wherein the step of presenting further comprises the step of

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presenting a pay-per-view movies listings screen that contains a targeted advertisement.

80. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a targeted advertisement over a currently-displayed television program.

81. The method defined in claim 46 further comprising the steps of:

allowing the user to set a reminder for a program;

displaying a targeted advertisement on top of the program for which the reminder was set;

providing the user with an opportunity to request additional information related to the displayed targeted advertisement; and

displaying additional information related to the displayed targeted advertisement when the user requests more information.

82. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a targeted advertisement that is an active object.

83. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a targeted advertisement to the user that contains targeted product information.

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84. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a targeted advertisement to the user that contains targeted product information and an associated selectable purchase option.

85. The method defined in claim 46 wherein the step of presenting further comprises the step of displaying a targeted advertisement to the user that contains targeted product information and an associated additional information option.

86. The method defined in claim 46 wherein the step of presenting further comprises the steps of:  
displaying a relatively small targeted advertisement to the user;  
allowing the user to select the displayed relatively small targeted advertisement; and  
displaying a corresponding substantially full-screen targeted advertisement containing video to the user when the user selects the displayed relatively small targeted advertisement.

87. The method defined in claim 46 further comprising the step of providing the targeted advertising with attribute tags.

88. The method defined in claim 46 further comprising the step of providing the targeted advertising with channel tags.

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89. The method defined in claim 46 further comprising the step of providing the targeted advertising with broadcast time tags.

90. The method defined in claim 46 further comprising the step of providing the targeted advertising with program tags.

91. A system in which an interactive television program guide is implemented on user television equipment, comprising:

means for monitoring a user's interactions with the interactive television program guide to determine the user's interests; and

means for taking a targeted action in the interactive television program guide based on those interests.

92. The system defined in claim 91 wherein the means for taking the targeted action further comprises means for automatically setting a program reminder based on the user's interests.

93. The system defined in claim 91 wherein the means for taking the targeted action further comprises means for automatically presenting the user with an opportunity to set a program reminder that is based on the user's interests.

94. The system defined in claim 91 wherein the means for taking the targeted action further comprises means for offering a pay-per-view event for

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purchase to the user that is based on the user's interests.

95. A method for taking targeted actions in an interactive television program guide implemented on user television equipment, comprising the steps of:

monitoring a user's interactions with the interactive television program guide to determine the user's interests; and

taking a targeted action in the interactive television program guide based on those interests.

96. The method defined in claim 91 wherein the step of taking the targeted action further comprises the step of automatically setting a program reminder based on the user's interests.

97. The method defined in claim 91 wherein the step of taking the targeted action further comprises the step of automatically presenting the user with an opportunity to set a program reminder that is based on the user's interests.

98. The method defined in claim 91 wherein the step of taking the targeted action further comprises the step of offering a pay-per-view event for purchase to the user that is based on the user's interests.



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99. A system in which an interactive television program guide is implemented on user television equipment, comprising:

means for monitoring a user's interactions with the interactive television program guide to determine the user's interests; and

means for displaying targeted advertising based on the user's interests with the program guide; and

means for monitoring which advertisements are displayed by the program guide; and

means for transmitting information on which advertisements are displayed to a central facility.

100. The system defined in claim 99 further comprising means for maintaining a monitoring record containing information on which advertisements are displayed.

101. The system defined in claim 100 wherein the means for maintaining the monitoring record further comprises means for maintaining an advertisement identifier that identifies each targeted advertisement that is displayed in the monitoring record.

102. The system defined in claim 100 wherein the means for maintaining the monitoring record further comprises means for maintaining information on the date and time of the display of each targeted advertisement in the monitoring record.

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103. The system defined in claim 100 wherein the means for maintaining the monitoring record further comprises means for maintaining information on the location in the program guide in which each targeted advertisement is displayed in the monitoring record.

104. The system defined in claim 100 wherein the means for maintaining the monitoring record further comprises means for maintaining information on the reasons that each targeted advertisement was displayed by the program guide in the monitoring record.

105. A method for using an interactive television program guide implemented on user television equipment to monitor the effectiveness of targeted advertising, comprising the steps of:

monitoring a user's interactions with the interactive television program guide to determine the user's interests;

displaying targeted advertising based on the user's interests with the program guide;

monitoring which advertisements are displayed by the program guide; and

transmitting information on which advertisements are displayed to a central facility.

106. The method defined in claim 105 further comprising the step of maintaining a monitoring record containing information on which advertisements are displayed.

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107. The method defined in claim 106 wherein the step of maintaining the monitoring record further comprises the step of maintaining an advertisement identifier that identifies each targeted advertisement that is displayed in the monitoring record.

108. The method defined in claim 106 wherein the step of maintaining the monitoring record further comprises the step of maintaining information on the date and time of the display of each targeted advertisement in the monitoring record.

109. The method defined in claim 106 wherein the step of maintaining the monitoring record further comprises the step of maintaining information on the location in the program guide in which each targeted advertisement is displayed in the monitoring record.

110. The method defined in claim 106 wherein the step of maintaining the monitoring record further comprises the step of maintaining information on the reasons that each targeted advertisement was displayed by the program guide in the monitoring record.

111. A system in which an interactive television program guide is implemented on user television equipment, comprising:

means for monitoring a user's interactions with the interactive television program guide to determine the user's interests;

means for taking targeted actions in the program guide based on the user's interests;

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means for monitoring which targeted actions are taken by the program guide; and

means for transmitting information on which targeted actions are taken by the program guide to a central facility.

112. The system defined in claim 111 further comprising means for maintaining a monitoring record containing information on which targeted actions are taken in the program guide.

113. The system defined in claim 112 wherein the means for maintaining the monitoring record further comprises means for maintaining in the monitoring record an identifier that identifies each targeted action that is taken in the program guide.

114. The system defined in claim 112 wherein the means for maintaining the monitoring record further comprises means for maintaining in the monitoring record information on the date and time each targeted action is taken in the program guide.

115. The system defined in claim 112 wherein the means for maintaining the monitoring record further comprises means for maintaining in the monitoring record information on the location in the program guide in which each targeted action is taken.

116. The system defined in claim 112 wherein the means for maintaining the monitoring record further comprises means for maintaining information on the

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reasons that each targeted action was taken in the monitoring record.

117. A method for using an interactive television program guide implemented on user television equipment, comprising the steps of:

monitoring a user's interactions with the interactive television program guide to determine the user's interests;

taking targeted actions in the program guide based on the user's interests;

monitoring which targeted actions are taken in the program guide based on the user's interest; and

transmitting information on which targeted actions are taken to a central facility.

118. The method defined in claim 117 further comprising the step of maintaining a monitoring record containing information on which targeted actions are taken.

119. The method defined in claim 118 wherein the step of maintaining the monitoring record further comprises the step of maintaining in the monitoring record an identifier that identifies each targeted action taken.

120. The method defined in claim 118 wherein the step of maintaining the monitoring record further comprises the step of maintaining information in the

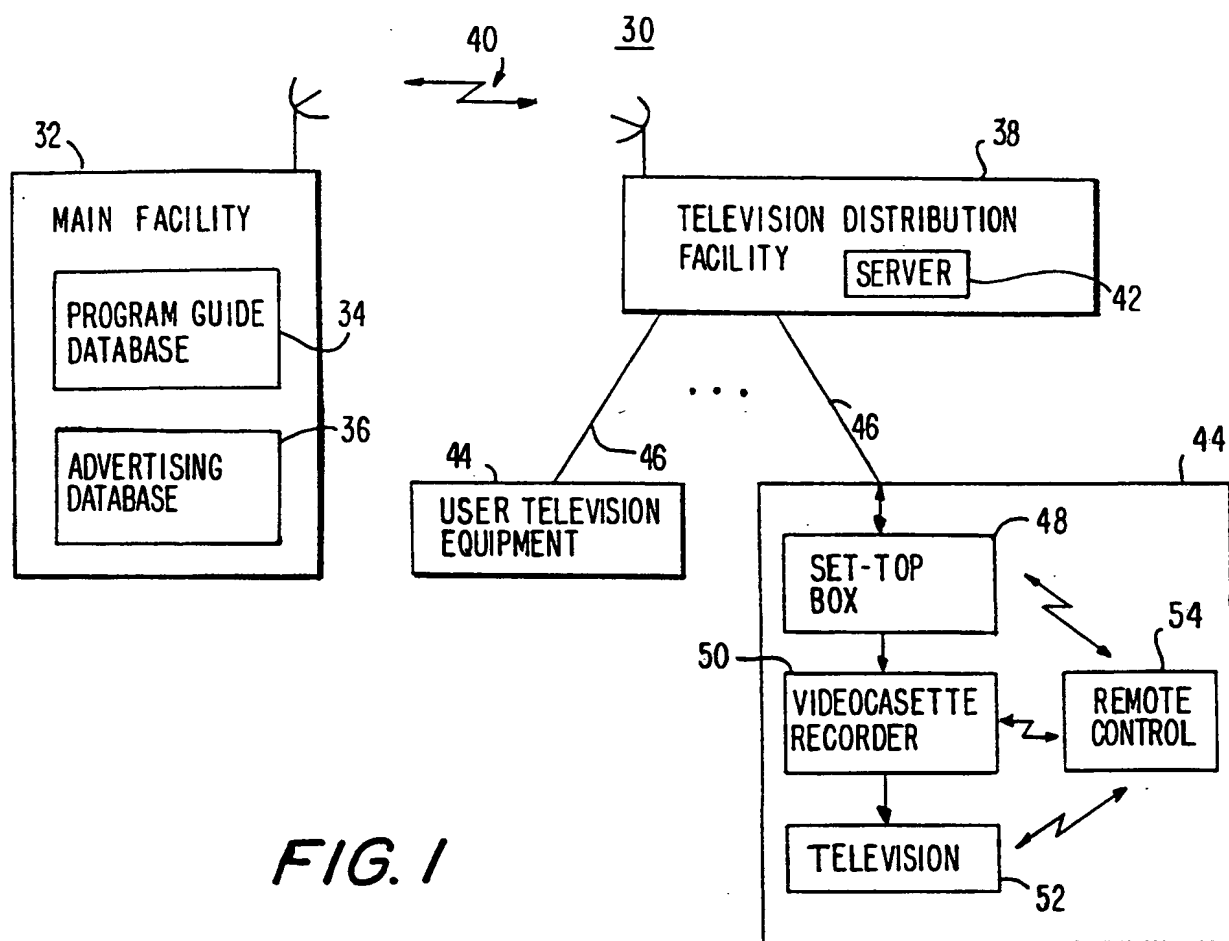
- 56 -

monitoring record on the date and time each targeted action is taken.

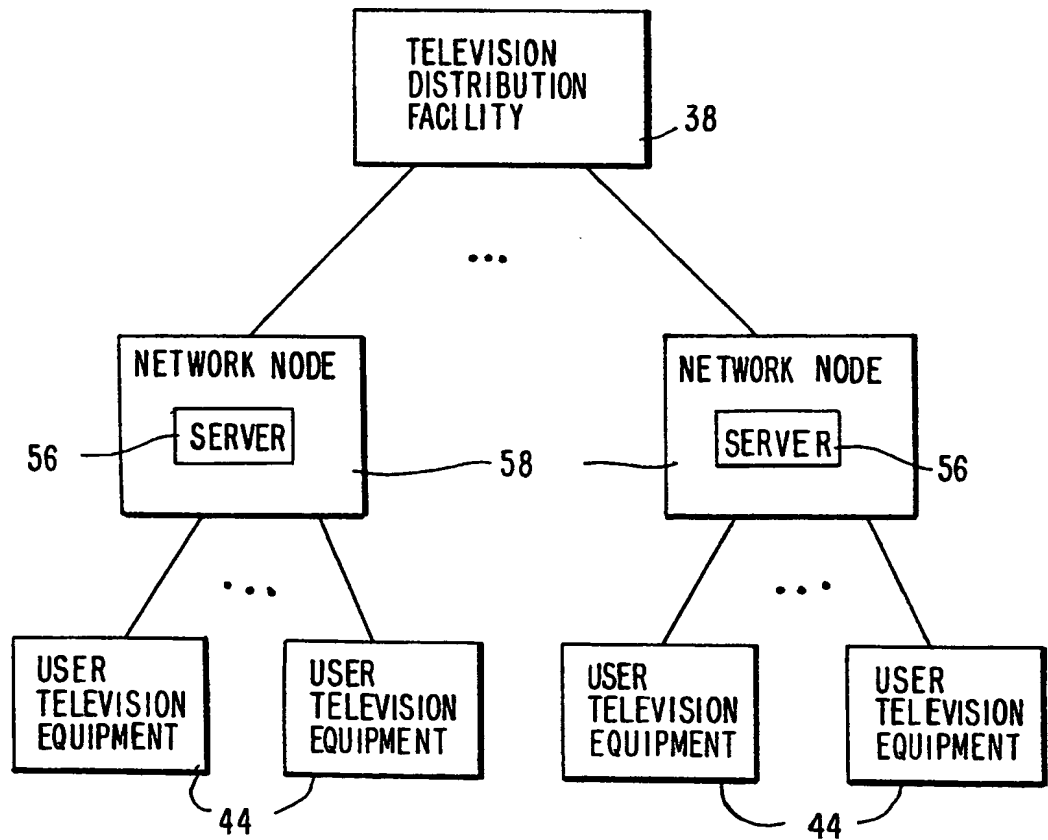
121. The method defined in claim 118 wherein the step of maintaining the monitoring record further comprises the step of maintaining information in the monitoring record on the location in the program guide in which each targeted action is taken.

122. The method defined in claim 118 wherein the step of maintaining the monitoring record further comprises the step of maintaining information in the monitoring record on the reasons that each targeted action was taken in the program guide.

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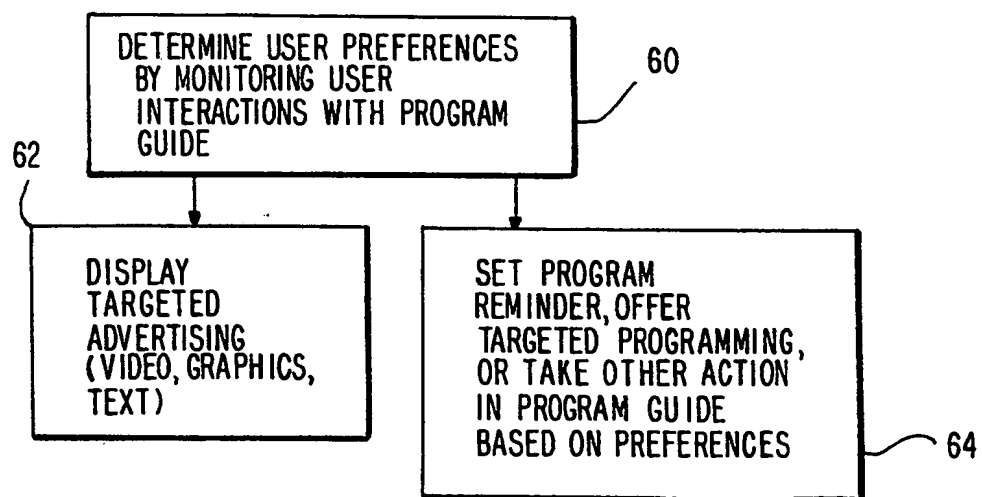
**FIG. 1**

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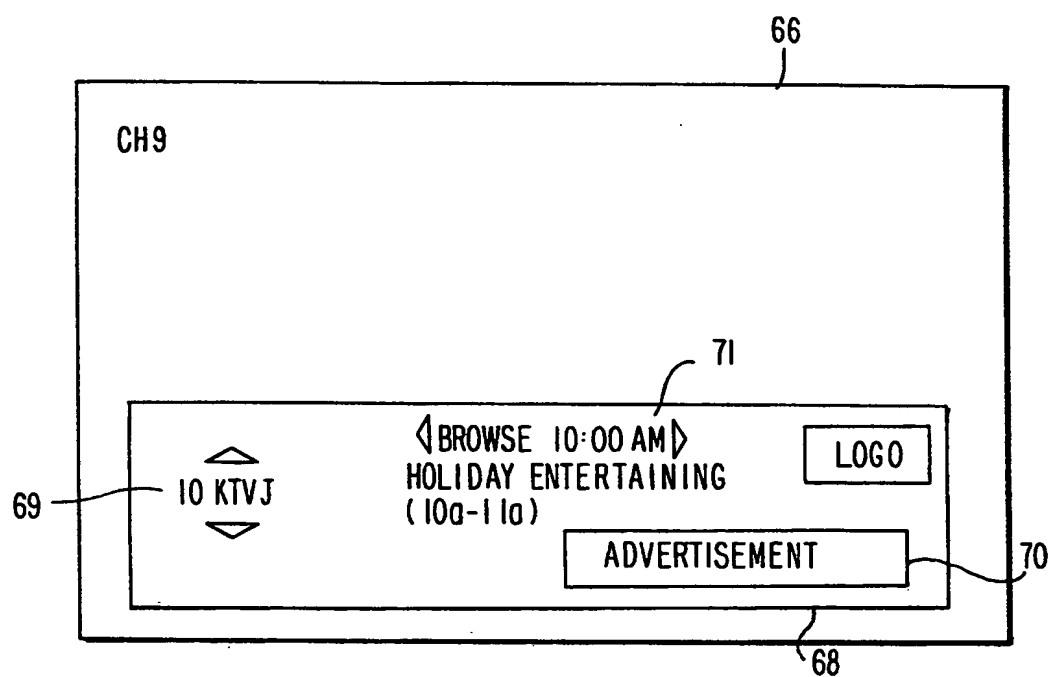
**FIG. 2**



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*FIG. 3*

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*FIG. 4*

5/28

SET REMINDER

WOULD YOU LIKE TO SET A REMINDER FOR THIS PROGRAM ?

10 KTVK	HOLIDAY ENTERTAINING	10-11a
---------	----------------------	--------

☐ YES ☐ NO

ADVERTISEMENT

72

74

76

78

80

82

*FIG. 5*

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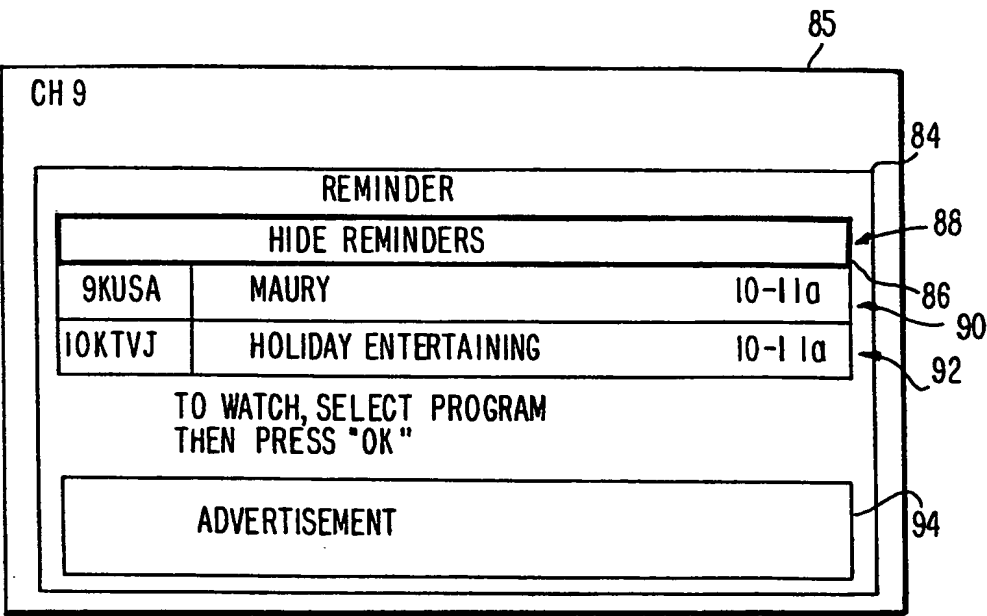
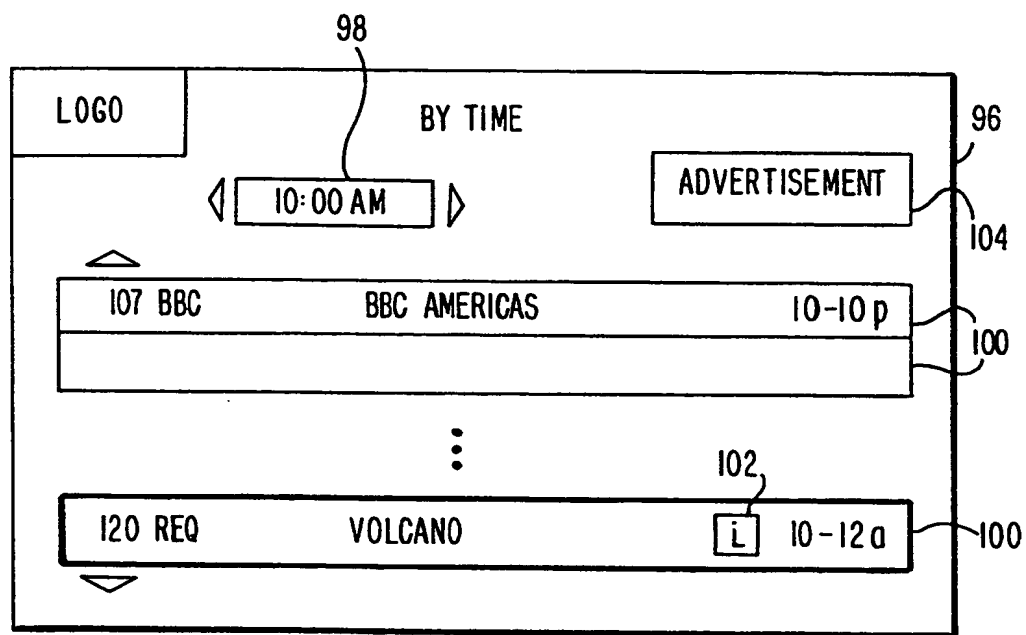
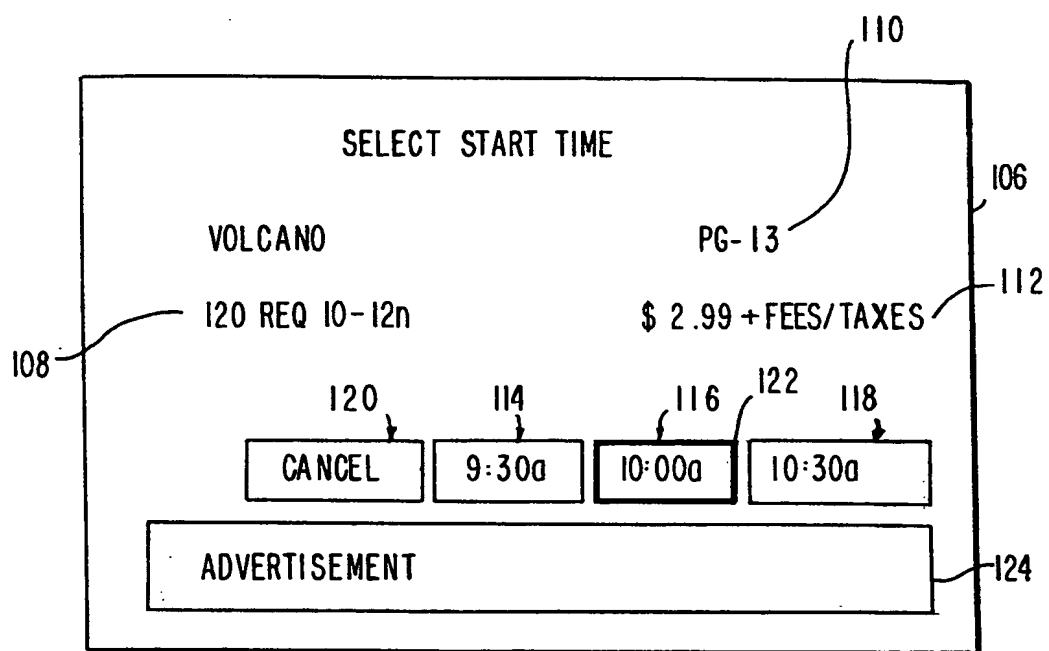


FIG. 6

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*FIG. 7*

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**FIG. 8**

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ORDER REVIEW

VOLCANO PG-13

185 REQ 10:30a \$ 2.99 + FEES / TAXES

130 128

CONFIRM <> CANCEL

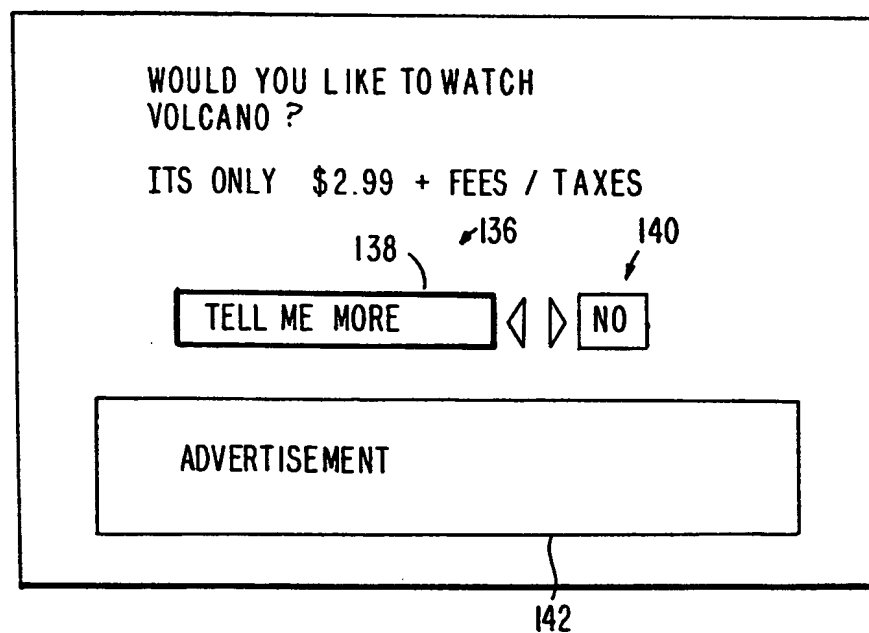
ADVERTISEMENT 132

126

Detailed description: This diagram illustrates the layout of an 'ORDER REVIEW' screen. At the top, the title 'ORDER REVIEW' is centered. Below it, the product name 'VOLCANO' is on the left and 'PG-13' is on the right. The next line displays order details: '185 REQ' on the left, '10:30a' in the center, and '\$ 2.99 + FEES / TAXES' on the right. Below these details are two buttons: 'CONFIRM' on the left and 'CANCEL' on the right, separated by a double-headed arrow. A label '130' points to the 'CONFIRM' button, and a label '128' points to the 'CANCEL' button. At the bottom of the screen is a rectangular area labeled 'ADVERTISEMENT'. A label '132' points to the right side of this advertisement area. A label '126' points to the right edge of the main screen frame.

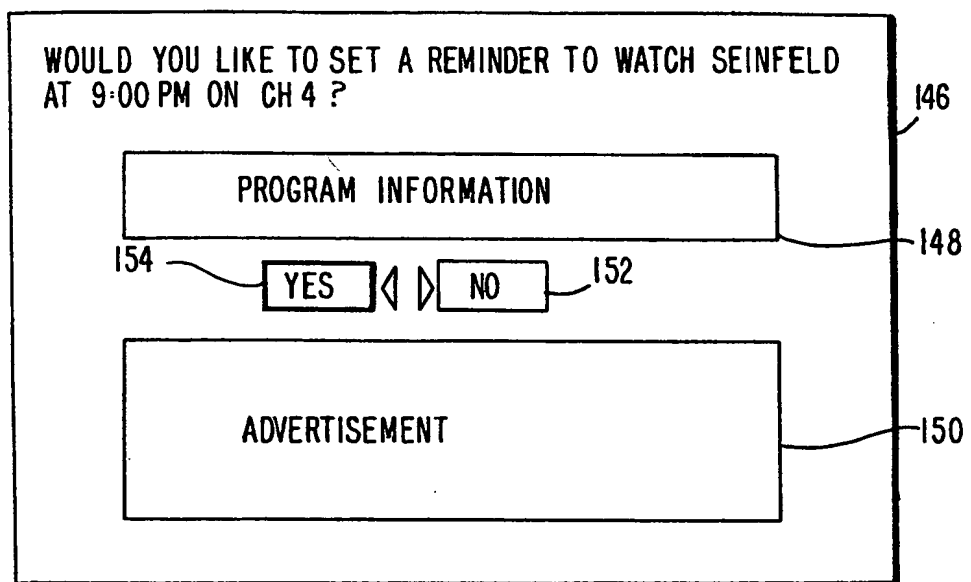
*FIG. 9*

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*FIG. 10*



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*FIG. 11*

12/28

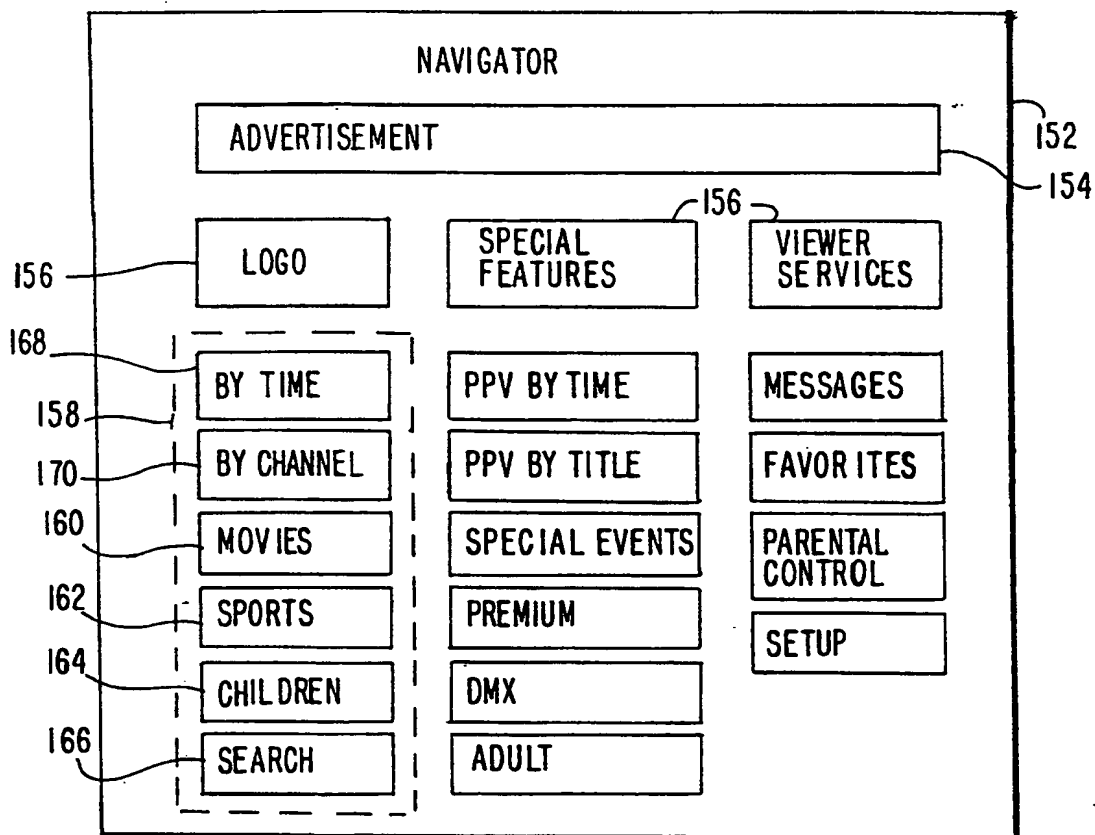
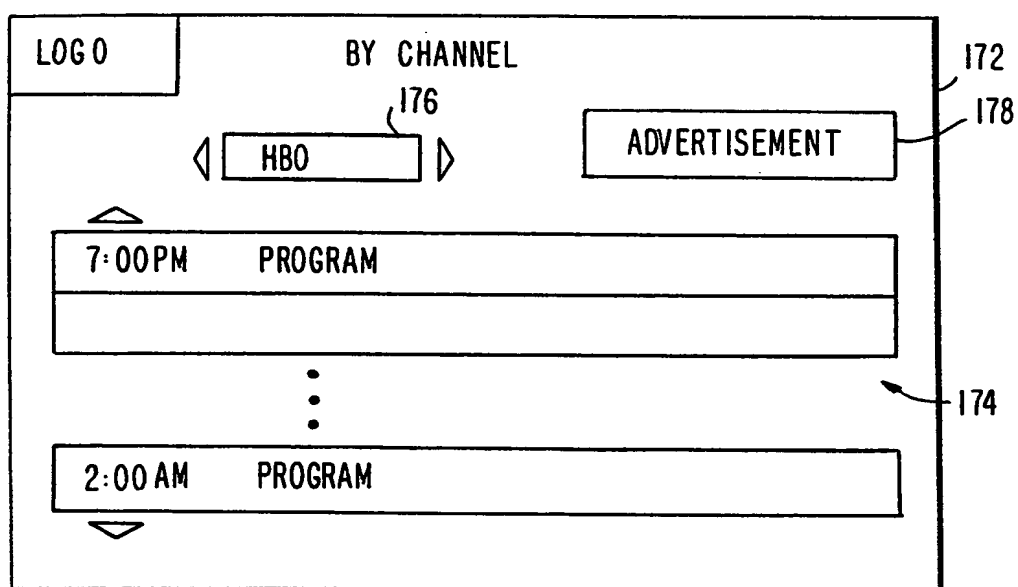


FIG. 12

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**FIG. 13**

*FIG. 14*

WOULD YOU LIKE TO  
WATCH  
DON KING: ONLY IN AMERICA?

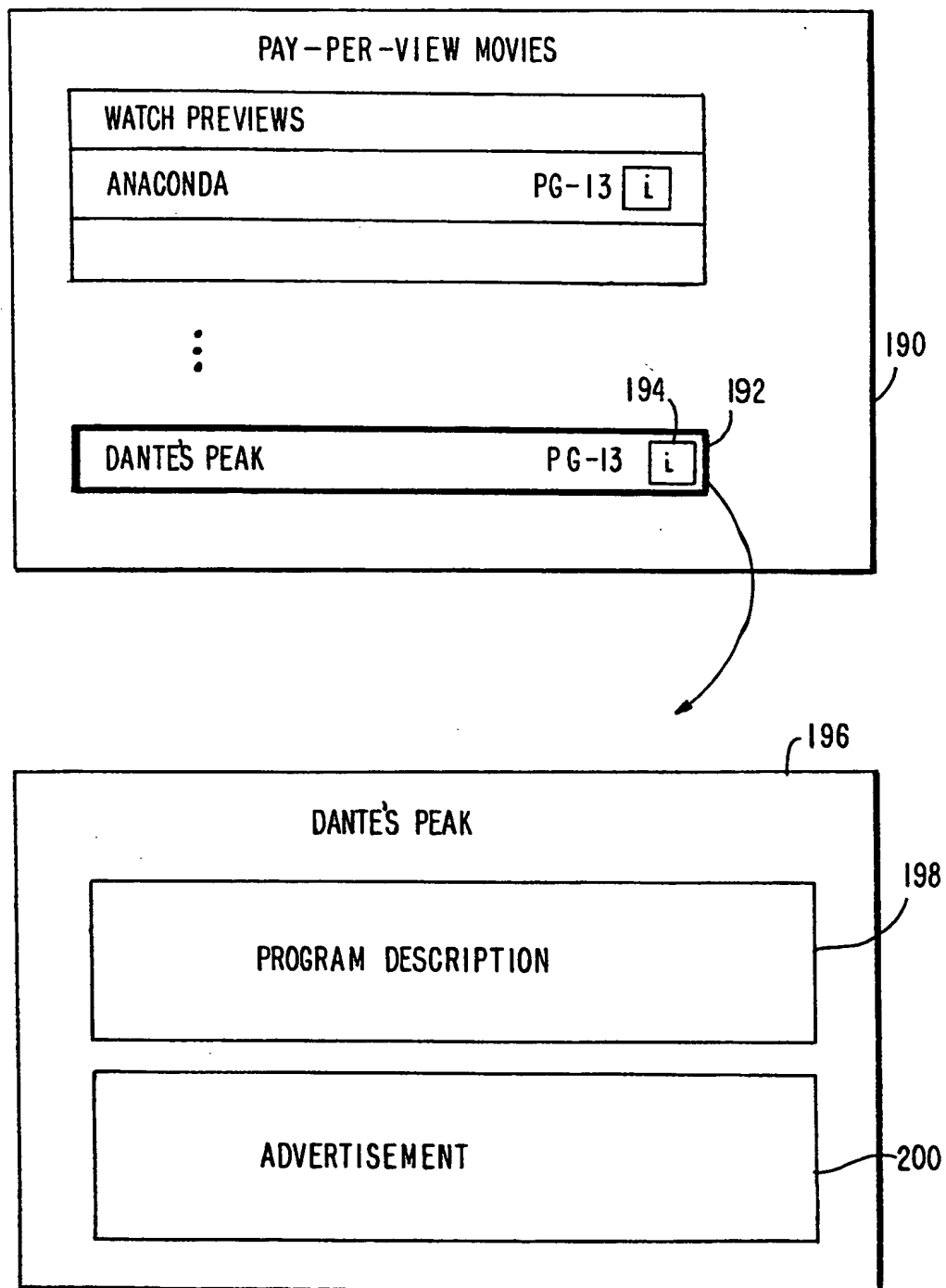
LOGO

188 — YES — — NO — 186

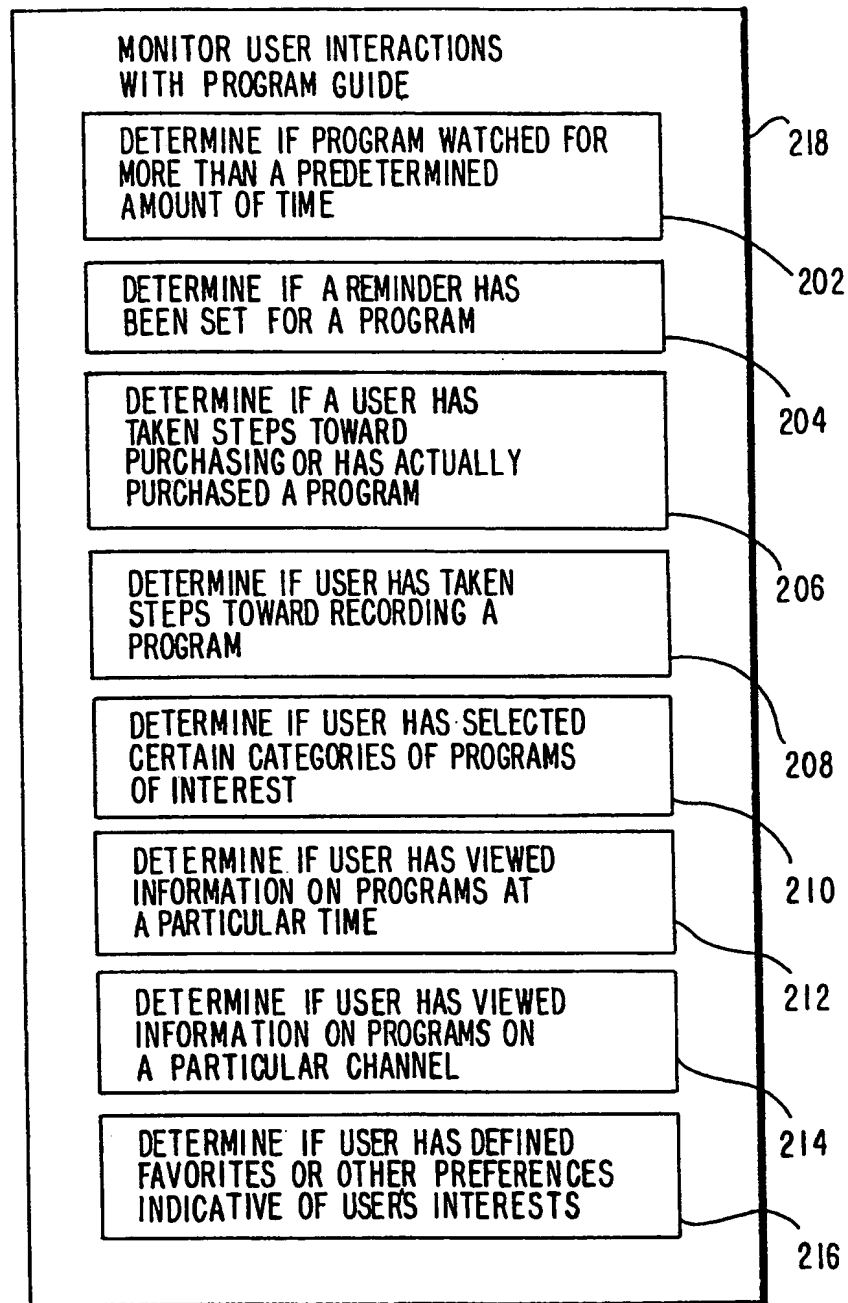
PROGRAM INFORMATION 182

ADVERTISEMENT 184

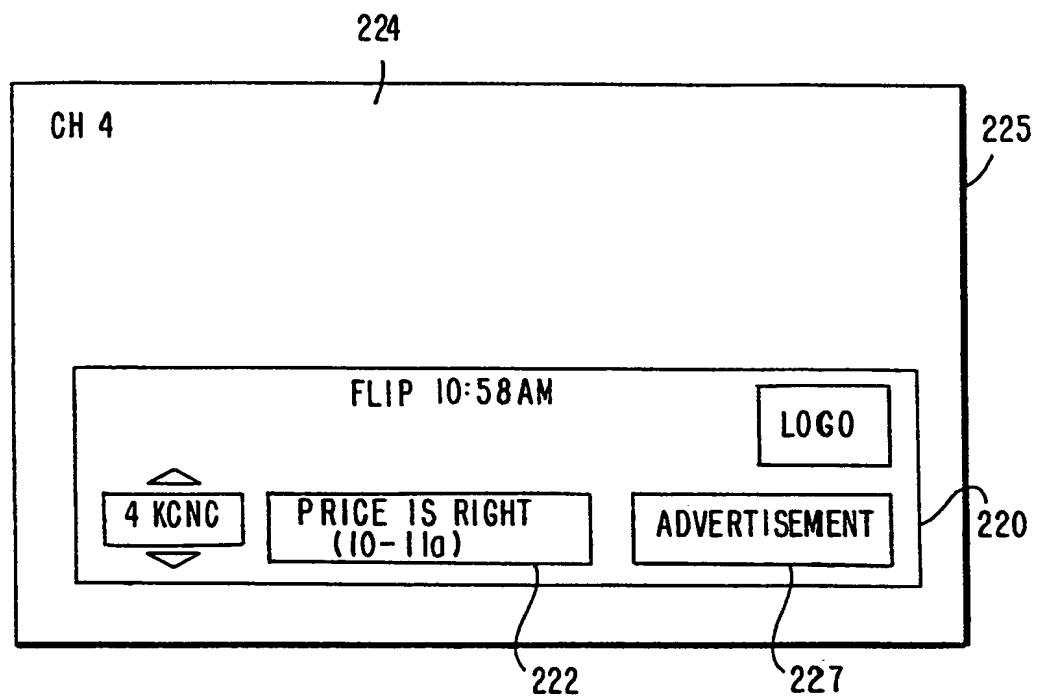
15/28

*FIG. 15*

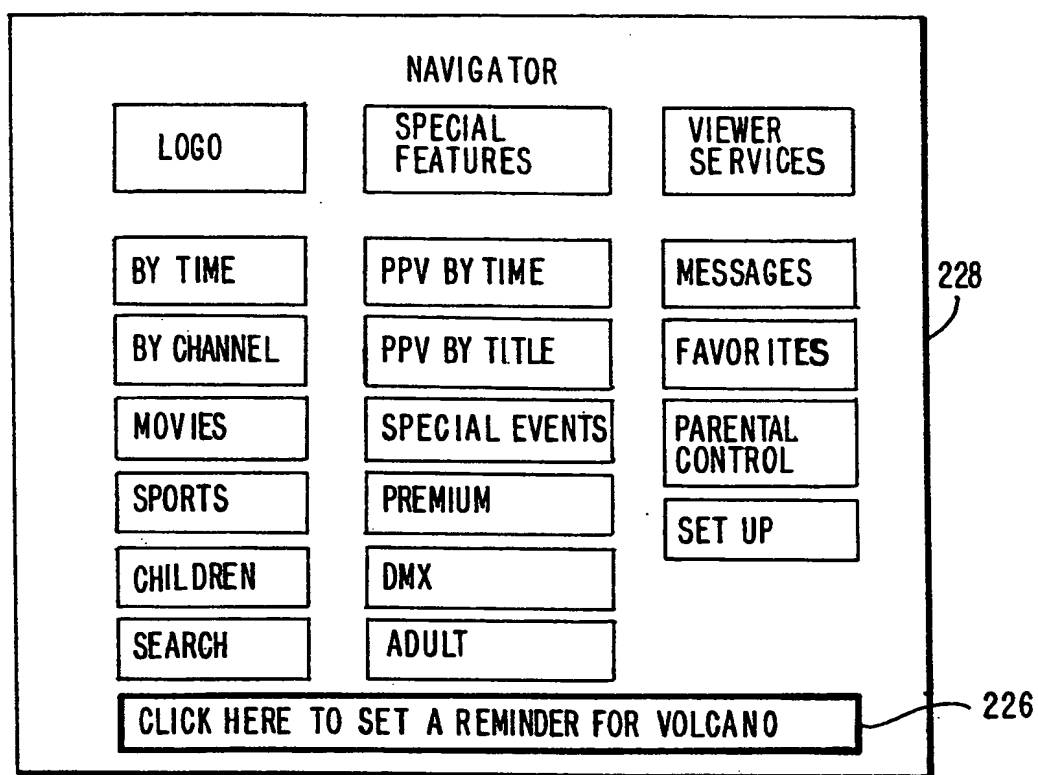
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**FIG. 16**

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*FIG. 17*

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*FIG. 18*



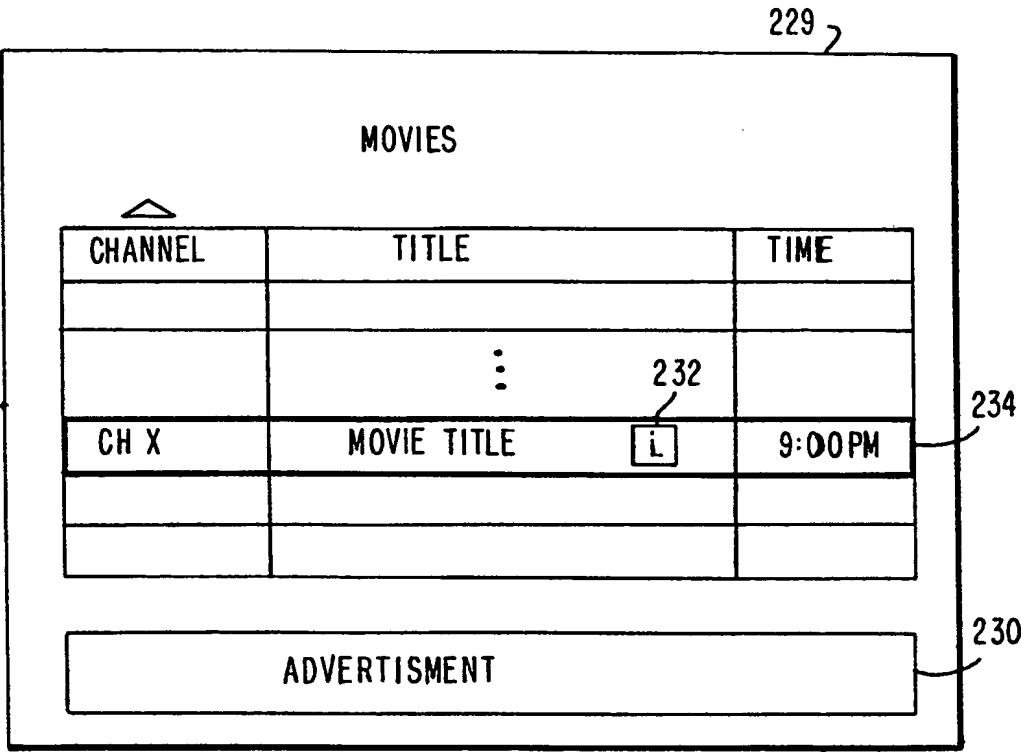
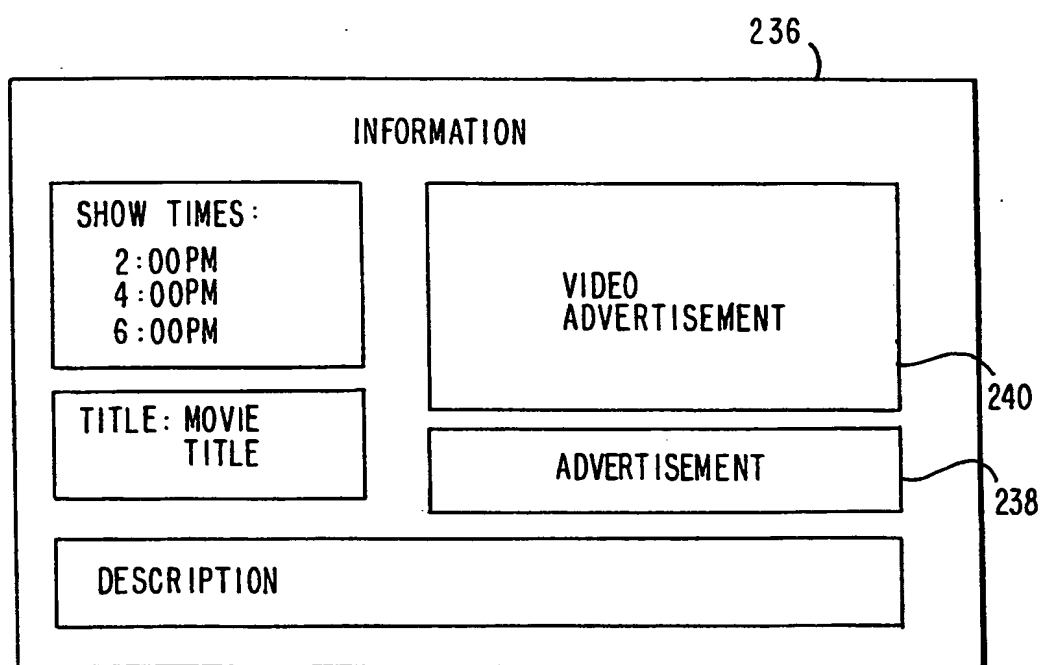


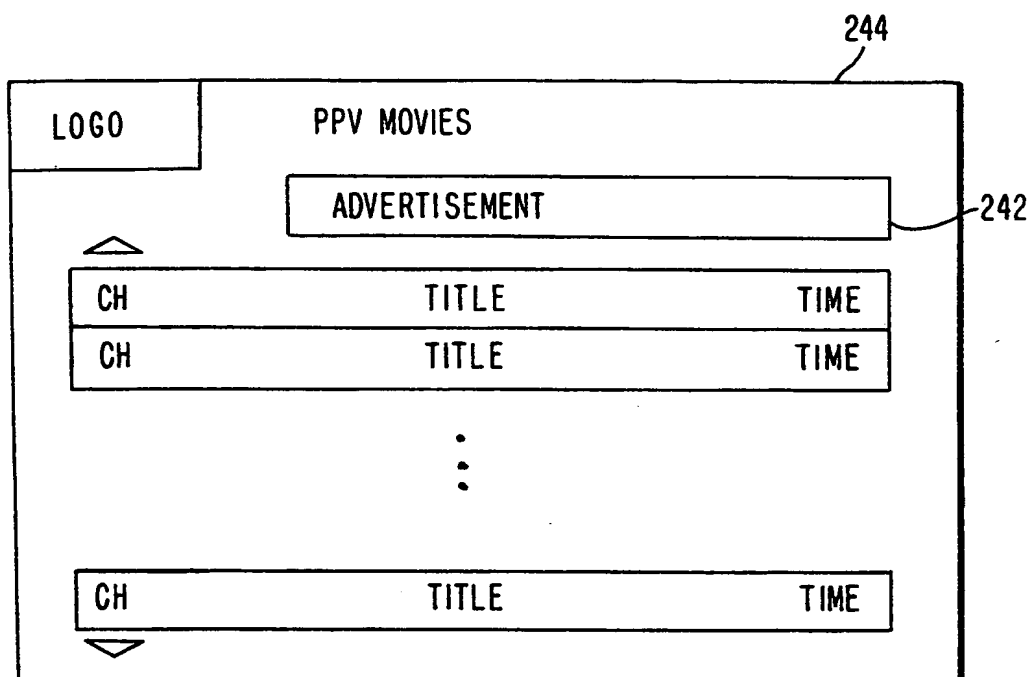
FIG. 19

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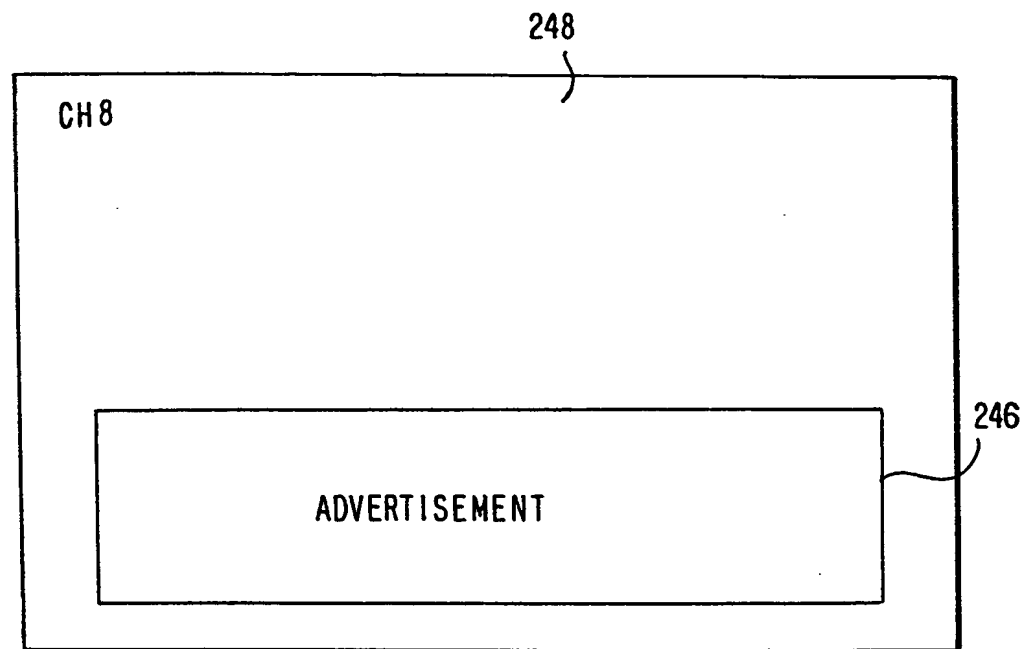


*FIG. 20*

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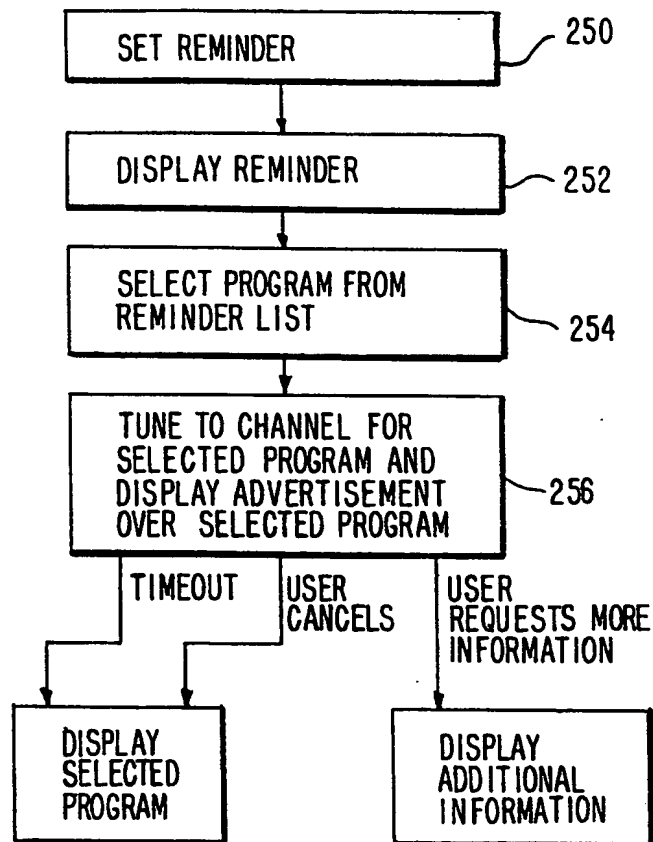
*FIG. 21*

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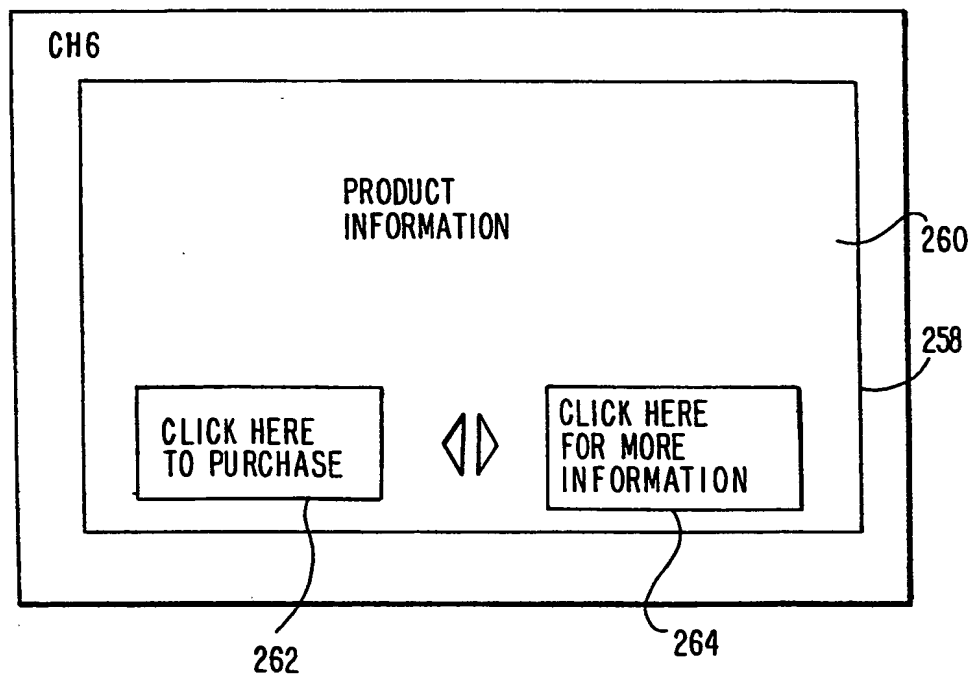


*FIG. 22*

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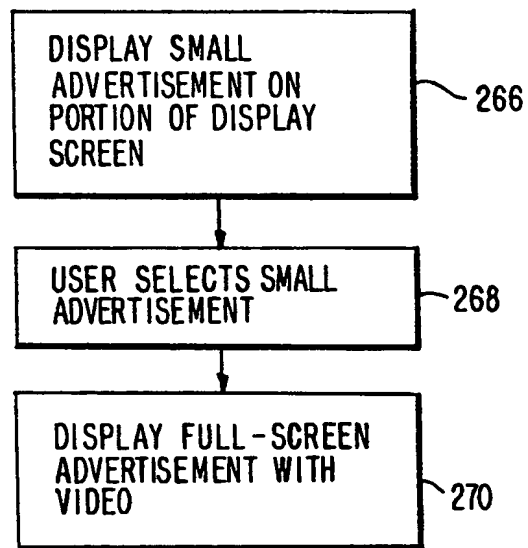
*FIG. 23*

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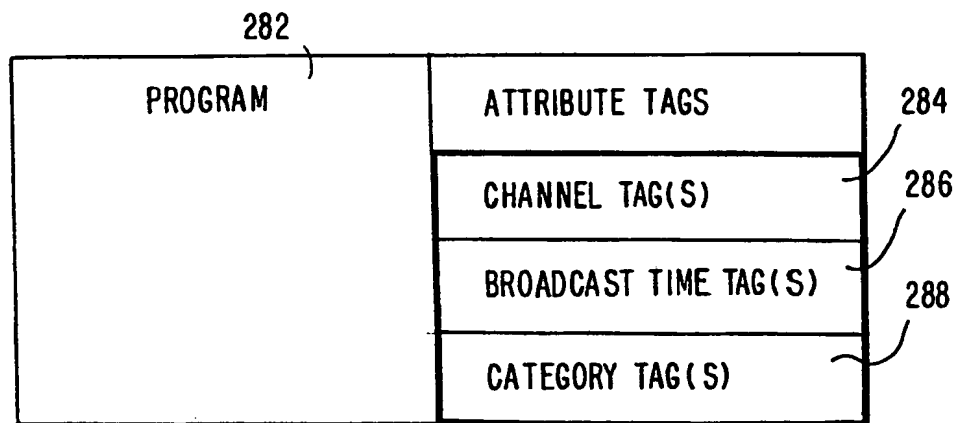
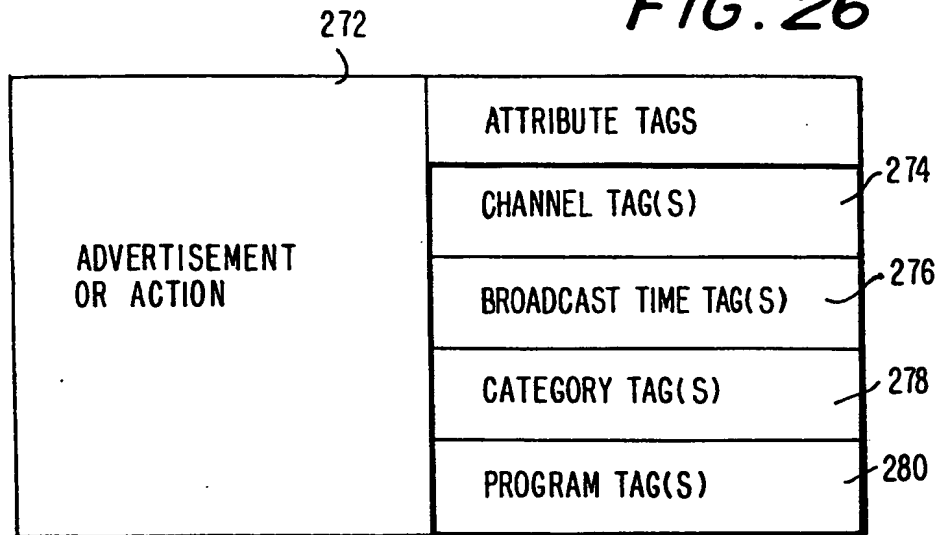


**FIG. 24**

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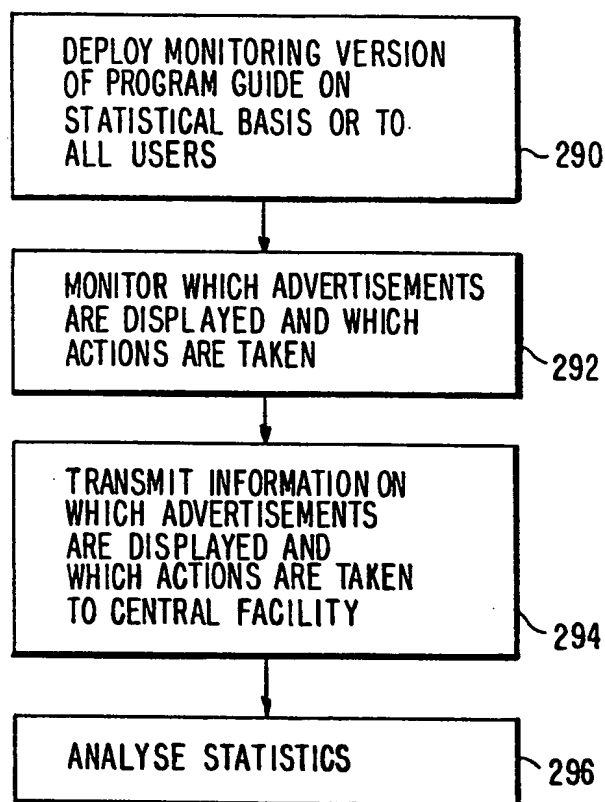
*FIG. 25*

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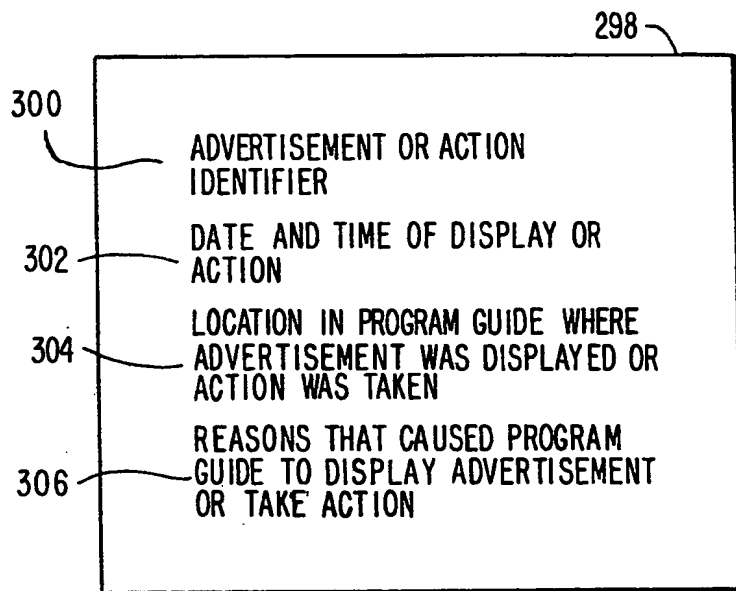
**FIG. 26****FIG. 27**



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**FIG. 28**

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**FIG. 29**

# INTERNATIONAL SEARCH REPORT

ii. National Application No

PCT/US 99/04163

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 6 H04N5/445 H04N7/16 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 223 924 A (STRUBBE HUGO J) 29 June 1993	1-4, 11, 17, 37, 38, 46, 48, 49, 56, 62, 82, 83, 91, 95, 99, 105, 111, 117
A	see column 1, line 55 - column 2, line 15; figures 1-5  ---  -/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

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I. national Application No

PCT/US 99/04163

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 48230 A (STARSIGHT TELECAST INC) 18 December 1997	1-5, 46-50, 91,95
A	see page 2, line 10 - page 3, line 11; figure 1	6,51, 99-102, 105-108, 111-114, 117-120
	see page 9, line 10 - page 12, line 13; figure 4	
	see page 18, line 26 - page 22, line 12; figures 8-10	
X	US 5 410 344 A (GRAVES ET ASL.) 25 April 1995	1,2,5, 46,47, 50,91, 95,99, 105,111, 117
	see column 2, line 23 - line 40; figures 1,2	
	see column 3, line 54 - column 4, line 51; figure 2	
	see column 6, line 17 - column 7, line 4; figures 4,5	
X	US 5 483 278 A (STRUBBE HUGO J ET AL) 9 January 1996	1,2,8, 46,47, 53,91, 95,99, 105,111, 117
	see abstract	
	see column 5, line 23 - column 6, line 62; figures 1-4	
	see column 2, line 35 - line 62	
A	WO 96 34491 A (TV GUIDE ON SCREEN) 31 October 1996	1-5, 8-11, 13-15, 19,36, 46-50, 53-55, 57-60, 63,81, 91,92, 94-98
	see page 30, line 3 - page 31, line 24; figures 15,23	
	see page 21, line 25 - page 24, line 37; figures 11-13	
	see page 6, line 18 - page 7, line 32	

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/04163

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5223924	A	29-06-1993	DE 69322439 D EP 0572090 A JP 6197342 A US 5469206 A US 5483278 A	21-01-1999 01-12-1993 15-07-1994 21-11-1995 09-01-1996
WO 9748230	A	18-12-1997	AU 3294997 A	07-01-1998
US 5410344	A	25-04-1995	NONE	
US 5483278	A	09-01-1996	US 5469206 A US 5223924 A EP 0628919 A JP 7073243 A DE 69322439 D EP 0572090 A JP 6197342 A	21-11-1995 29-06-1993 14-12-1994 17-03-1995 21-01-1999 01-12-1993 15-07-1995
WO 9634491	A	31-10-1996	AU 5572996 A BR 9608005 A CA 2218993 A EP 0823179 A JP 11501481 T PL 323047 A US 5589892 A	18-11-1996 05-01-1999 31-10-1996 11-02-1998 02-02-1999 02-03-1998 31-12-1996



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(75) Inventor/Applicant (for US only) : LEWIS, Creighton, Martin, Cecil [GB/GB]; Oakfield, Llanbadoch, Usk, Gwent NP5 1TG (GB).

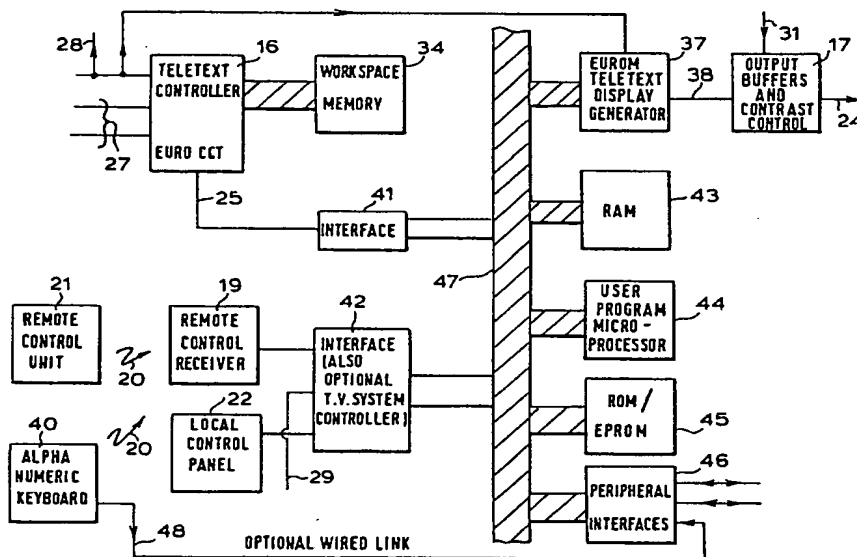
(74) Agent: MESSULAM, Moses, Alec; A. Messulam &amp; Co., 24, Broadway, Leigh on Sea, Essex SS9 1BN. (GB).

(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB, GB (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.

Published

With international search report.

## (54) Title: INFORMATION PROCESSING APPARATUS



## (57) Abstract

A television receiver including Teletext decoder and display circuitry and a user programmable computer which comprises a processor connected to communicate with the Teletext display circuit and with the display memory of the Teletext circuitry. The invention provides the user of greater freedom in manipulation of data received by Teletext and also permits an inexpensive realisation of a computer by enabling several circuits to be shared between the computer and the Teletext circuits.

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## INFORMATION PROCESSING APPARATUS

The present invention is concerned with a combined television broadcast receiver and a user programmable computer.

- 5 A broadcast television signal generally consists of both a video signal and an audio signal, each modulated onto a radio frequency carrier. The video signal contains the picture of information used to convey brightness and colour information and synchronising information to  
10 permit the receiver to reconstruct the transmitted picture and display it. The audio signal contains the audio channel associated with the picture and any synchronising information associated with it, for example, for decoding a stereo audio transmission for  
15 output to two loudspeakers.

- The block diagram of a simple colour television receiver is shown in Figure 1. The required television channel containing a video signal and its associated audio signal is selected by the viewer on the channel selector  
20 2, which generates a control voltage to cause the tuner 1 to select the required signal from all those received by the aerial 3 and to convert the selected signals to fixed I.F. frequencies (intermediate frequencies) for amplification by the amplifier incorporated in the  
25 amplifier and detector module 4. The detector portion of the module 4 recovers the baseband video signal and also recovers the audio signal still in modulated form.

- The audio signal recovered by the detector 4 is further amplified and the baseband audio signal is recovered in  
30 the sound intermediate frequency amplifier and detector module 5. The baseband audio signal is then further amplified in the audio amplifier 6 and fed to the loudspeaker 7.



The baseband video signal is fed to a synchronising pulse separator 10 which recovers the timing information used to position the electron beam in the correct position on the cathode ray tube (C.R.T.) screen 13.

5 Deflection of the beam occurs by the action of a line timebase 11 and frame timebase 12 which drive deflection coils 14 placed around the neck of the tube 13.

The line timebase 11 also produces various timing signals to assist other modules 8 and 9 to produce good

10 quality video signals, but this will not be described in detail as it is not relevant to the present invention.

The baseband video signal from the detector 4 is also applied to a colour decoder module 8 which recovers from the one video signal the colour difference signals and

15 the analogue luminance signal, the latter corresponding to the video signal displayed by a black and white television receiver. The colour and luminance signals are processed to generate three separate signals for the red, green and blue guns of the tube, respectively,

20 these signals being amplified in the video amplifiers 9 and used to modulate the three electron beams in the tube 13.

Television signals currently transmitted by the broadcasting authorities in Europe contain extra

25 information over and above the picture information and its associated synchronising information. This extra information represents textual and graphical information and associated synchronising and control information. With the addition of suitable circuitry to the

30 television receiver shown in Figure 1, the received textual and graphical information can be selectively stored and then displayed under user control on the tube 13 instead of, or simultaneously with, the received video signal.

The portion of the overall European broadcast television system providing text and graphical information is known as a Level 1 Teletext system (see Characteristics of Teletext Systems. Vol 11, Report 957, CCIR XV Plenary Session Geneva, 1982). Several higher levels have been defined in the same reference which provide for more complex data formats than Level 1, thus allowing for higher resolution graphics and for finer control of the range of colours displayed in the Teletext picture, and allowing for control of the presentation of a mixed broadcast video and Teletext picture.

Teletext information is normally transmitted in timing periods when neither video nor synchronising information is being transmitted. The effect to the viewer is that Teletext information appears to be transmitted simultaneously with video information. There is, however, also a Teletext transmission mode in which the video information is not transmitted in order to permit almost continuous transmission of Teletext information. This mode can be used, for example, for rapid transmission of computer programs or of large volumes of data.

Integrated circuits for implementing Level 1 Teletext functions in a television receiver have been produced by numerous manufacturers, but those most commonly used are designed and manufactured by Philips (trading as Mullard in the U.K.). The first generation of Philips Teletext integrated circuits are described in "LSI Circuits for Teletext and Viewdata - the Lucy Generation. Mullard Technical Publication M81-0001, 1981", while the second generation are described in "Computer Controlled Teletext. J. R. Kinghorn, Electronic Components and Applications, Vol 6, No. 1, p 15, Philips Electronic Components and Material Division, 1984" and in "User Manual, Computer Controlled Teletext. Philips, 1984".

Teletext signals are recovered from the baseband video signal by and stored in a Teletext decoder. The decoder also generates the video signals which cause the Teletext display to appear on the tube 13. Figure 2  
5 shows the organisation of a second generation decoder using Philips components.

Baseband video signals 26 received from the video detector 4 over the line 26 are processed in the video processor 15 (based on component SAA5230 VIP2) in order  
10 to detect and recover all Teletext signals. These Teletext signals appear, together with timing waveforms for synchronising purposes, on output lines 27. The video processor 15 also separates the television synchronising signals from the video and Teletext information,  
15 applying the synchronising signals to line 28. In the absence of video input on line 26, the video processor generates television synchronising signals on line 28.

Teletext data output in serial form on lines 27 is interrogated by the controller portion of the controller  
20 and display generator 16 (based on component SAA5240 EUROCCCT). Only that data which the controller has been commanded to accept is recovered and is written to the display memory 23. Commands to the controller are received on a serial control and data bus 25 from a  
25 controlling microcomputer 18 whose control program is fixed in read only memory on the microcomputer integrated circuit. Commands from the user are received by the microcomputer either from a local control panel 22 or via an infra-red link 20 and a receiver 19 from a  
30 remote control unit 21.

The local or remote control panels 22, 21 can also be arranged to control television receiver functions channel selection, contract, volume, brightness, colour hew and saturation by incorporating extra control  
35 programs in the microcomputer 18 and by arranging for

SECRET  
DPI

suitable control electronics to be incorporated into the receiver and connected to the microcomputer 18 via the serial control bus 25,29. The control electronics will be described below with reference to Figure 3.

- 5 The display portion of the controller and display generator 16 reads data and display formatting information from the memory 23 and generates colour video signals on line 30 in synchronism with the display scan circuits 11, 12 in Fig. 1. These video signals are  
10 processed and buffered in the block 17 and then sent over the line 24 to the second input of the video mixer of Figure 1. The block 17 includes a contrast control circuit which receives a control signal from the television control circuits over the line 31.
- 15 Figure 3 shows a simplified partial block diagram of a television receiver with the Teletext decoder incorporated. The reference numerals used in Figure 3 correspond with those used in Figures 1 and 2 and it is believed that this block diagram will be clear with  
20 little further explanation. Here the television channel selection input to the tuner 1, colour and video mixing controls to the colour decoder and video mixer 8, picture contrast and brightness control to the video amplifier 9 and volume control and muting to the audio  
25 amplifier 6 are all generated by the microcomputer in the Teletext decoder and controller module.

Level 3 Teletext has been implemented in a Philips integrated circuit (I.C.) known as EUROM which is described in "User's Manual, SAA5350 European Read-Only  
30 Memory (EUROM). Mullard Application Laboratory, Mitcham, 1983". Whereas the Level 1 Teletext integrated circuit 16, Figure 2 and the second generation integrated circuits mentioned above implement both data acquisition control and data display, the EUROM I.C. implements  
35 Level 3 display facilities only. It is recommended by

the manufacturers that data acquisition control be handled at present by using the control portion of the Level 1 circuit. Figure 4 shows the configuration required.

5 The display controller 37, comprising the EUROM I.C., and its display memory communicate with each other by means of a 16-bit parallel multiplexed address and data bus 35. This bus can also operate in an 8-bit mode, either the least significant 8-bits or the most significant 8-bits being transferred, and in this mode the system control microcomputer 36 accesses other devices on the bus. Commands are transmitted from the microcomputer 36 to the EUROM display controller 37 in 8-bit mode, and data is transferred from the microcomputer 36 to the display memory 39 in 8-bit mode. This display data is retrieved from the Teletext data acquisition circuit 16 on the serial bus 25. The data acquisition circuit 16 selects the data from the data stream on line 27 in response to commands on the same serial bus 25 from the microcomputer 36.

Level 3 Teletext is compatible with Level 1 Teletext in that Level 3 broadcast information can be received by Level 1 circuitry, even though such circuitry cannot display Level 3 information. Level 3 display circuitry can also display Level 1 information.

All of the above described circuitry uses either a completely hard-wired controller, such as the Lucy chip in the case of earlier implementations, or a microcontroller 18, 26 whose program is in read-only memory on the same chip as the microcontroller logic. The user of the system is therefore limited to those functions provided by the system designer and manufacturer.

In accordance with the present invention, there is provided in combination a television receiver including Teletext decoder and display circuitry and a computer, characterised in that the computer is user programmable and comprises a processor which is connected to communicate with the Teletext display circuit and with the display memory of the Teletext circuitry.

The invention in broad terms proposes the replacement of the microcomputer with its programs in ROM by a user programmable computer. The resultant combination offers several important advantages which will now be considered.

When a personal computer is connected to a domestic broadcast television receiver instead of a visual display unit, the quality of the display is generally inferior to that of a purpose built monitor. The reason for this poor resolution is limited bandwidth and synchronisation problems which occur when the digital output of the computer is first modulated onto a carrier and then demodulated in the television receiver. By contrast, Teletext display circuits are able to provide good legibility of alphanumeric information because the incoming information is stored in a local buffer memory and synchronisation is controlled by an internal clock, thereby ensuring greater precision in the positioning of characters on the screen. By enabling the computer output to share the Teletext circuitry, the invention enables a substantial improvement to be achieved in the display quality of the computer.

There is an increase in the amount of software that it transmitted using the Teletext channels. The invention enables such programs and data not only to be received and stored but also edited by the user.

When a television is used as a display for a computer, there is unnecessary duplication of several circuits in the two units. For example, a separate power supply is required for the computer and there is further a need  
5 for the computer to incorporate its own display memory and character generator both of which are already present in a receiver designed for reception of Teletext. Thus, in addition to the improvement in performance achieved, as compared with a computer  
10 connected to the aerial socket of a television receiver, the invention permits the combined television and personal computer to be manufactured less expensively and the cost need only be little more than the cost of a receiver alone, especially since the functions performed  
15 by the prior art Teletext processor may be implemented by programs contained in a read-only memory accessed by the user programmable computer.

Currently available computers can permit sophisticated sounds and even speech to be synthesised but the sound  
20 quality is limited by the amplifier and loudspeaker. A further advantage of the incorporation of a computer in a television receiver is that the computer may also now benefit by sharing the use of the sound channel of the television.

25 A still further advantage of the combination of the invention resides in the fact that the remote control unit provided for the receiver may be used as the keyboard input to the computer. The computer is therefore reduced to a small additional board which does  
30 not even require a separate housing and may conveniently be housed within the television cabinet.

When using a large screen television with a computer proximity to the screen can be a problem and by using the infra-red or other link of the remote control unit,  
35 the user may operate the computer from a safe distance.

The invention will now be described further, by way of example, with reference to the accompanying drawings, in which :

5           Figure 1 is a schematic block circuit diagram of a conventional television receiver, as described above,

Figure 2 is a block diagram of the circuits of a conventional receiver concerned with decoding and displaying Teletext information,

10           Figure 3 is a block diagram of television receiver including a Teletext decoder, only capable of providing low resolution images but in which the computer also serves to generate signals for the control of the operation of the television, such as the control of volume, contrast, brightness and colour,

Figure 4 is a partial block diagram of a Teletext receiver fitted with the Teletext circuitry for achieving high resolution images on the screen,

20           Figure 5 is a block diagram of a combined television and computer in accordance with the invention, and

Figure 6 is a partial block diagram of a modification of the arrangement shown in Figure 5.

25   In Figures 5 & 6, blocks described previously with reference to Figures 1 to 4 have all been allocated the same numerals and will not be described again. In essence, the invention replaces the Teletext system control functions of the microcomputer 36 with a user-  
30   programmable microprocessor system 44,



Some basic Teletext functions will be provided by means of programs supplied with the system, either in read-only memory 45 or in some other convenient form. Typical functions at this level include selection of pages for acquisition and display, double-height display of top or bottom half of the stored pages, a reveal function to display hidden information, display control display of T.V. picture, or Teletext picture, or both. Some more sophisticated functions which may also be provided are, for example, search for several pages simultaneously, store several pages, and switch rapidly between them.

Other functions which are not specific to broadcast Teletext manipulation will be provided by means of software which makes full use of the display facilities of the EUROM I.C. 37. As with the basic Teletext function control software, this software may be in read-only memory 45 or in some other convenient form, for example, a floppy disc in a disc drive connected to one of the peripheral ports 46. This additional software will provide a range of functions to assist the user to develop application programs. Typical functions allow user programs to plot points, draw lines and shapes, fill enclosed figures with chosen colours and patterns, define and draw characters and geometric shapes, select and modify the colours displayed on the screen via a colour palette table, cause portions of the screen to flash, move all or part of the displayed picture around the screen, and mix together portions of a broadcast or locally generated television picture with the computer generated picture. This class of function is provided in order to make it possible for the user to program the system to display anything that he wishes within the limits of the resolution of the EUROM logic 37.

The hardware of the EUROM I.C. 37 provides for display of 25 lines of either 40 or 80 characters chosen from a large character set and of dot matrix graphics with a

maximum full screen resolution of 240 horizontal by 250 vertical picture elements with a choice of 1 of 16 colours for each picture element, or with a maximum full screen resolution of 480 horizontal by 250 vertical picture elements with a choice of 1 of 4 colours for each picture element.

Other uses for the broadcast Teletext system, either by radio transmission direct from a ground station, or via a satellite, or by wire or fibre optic link, include distribution of computer software and of data bases. The proposed system is fully capable, when suitably programmed, of receiving this information and of making use of it. In particular programs can be stored, executed, and modified, and data bases can also be sorted, searched, and modified.

With the addition of a suitable interface 46, the system can access other computer systems such as, for example, Prestel or similar Viewdata or Videotex services. Basic television system control functions may be provided, but not necessarily by means of programs running in the user-programmable microprocessor 44. Typical of these functions are channel selection, contrast, colour, brightness and volume control, sound muting and system off/on.

The essential feature of this preferred embodiment is that the Teletext display circuitry 37, Teletext page memory now in the common system random access memory 43 and the user-programmable microprocessor 44 are intimately connected in such a way that the user can write programs which interact with the display circuitry 37, display memory 43, and various interfaces 41, 42, 46 and with the programs supplied with the system in order to generate data, collect broadcast Teletext data, manipulate and display any data in the system, and to control the displayed data and the display parameters.

In the embodiment illustrated in Figure 5, the user programmable microprocessor 44 executes programs in read-only memory 45 and in random access memory 43 via the parallel bus 47. The display controller EUROM I.C. 37 also accesses the random-access memory 43 via the parallel bus 47. Incoming Teletext data is received at the Teletext controller 16, which works under command from the microprocessor 44 via the interface 41 and serial bus 25. The commands to the Teletext controller 16 cause it to select and store in its workspace memory 34 those Teletext pages which the user wishes to capture. The stored Teletext data is then retrieved by the microprocessor 44, again via the serial bus 25 and interface 41.

15 Keyboard input to the microprocessor 44 is from a full alphanumeric keyboard 40 either via an infra-red link 20, the standard remote control receiver 19 and a serial to parallel interface 42, or else via a wired link 48 to one of the peripheral interface ports 46.

20 An alternative method of interconnection between Teletext controller 16, its workspace memory 34 and the user-programmable microprocessor 44 is shown in Figure 6, although it should be noted that this is much more difficult to realise with present technology. It does, however, have the advantage that the rate at which data can be recovered by the microprocesor is very much higher with the Figure 6 configuration than with the Figure 5 configuration.

30 In Figure 6, the microprocessor 44 and the Teletext controller 16 have direct access to the workspace memory 34, with control logic 49 arbitrating between the two on a time-shared basis. Teletext data is therefore collected by the microprocessor 44 direct from the workspace memory 34. Commands to the Teletext controller 16 continue to be transmitted via the interface 41 and

35

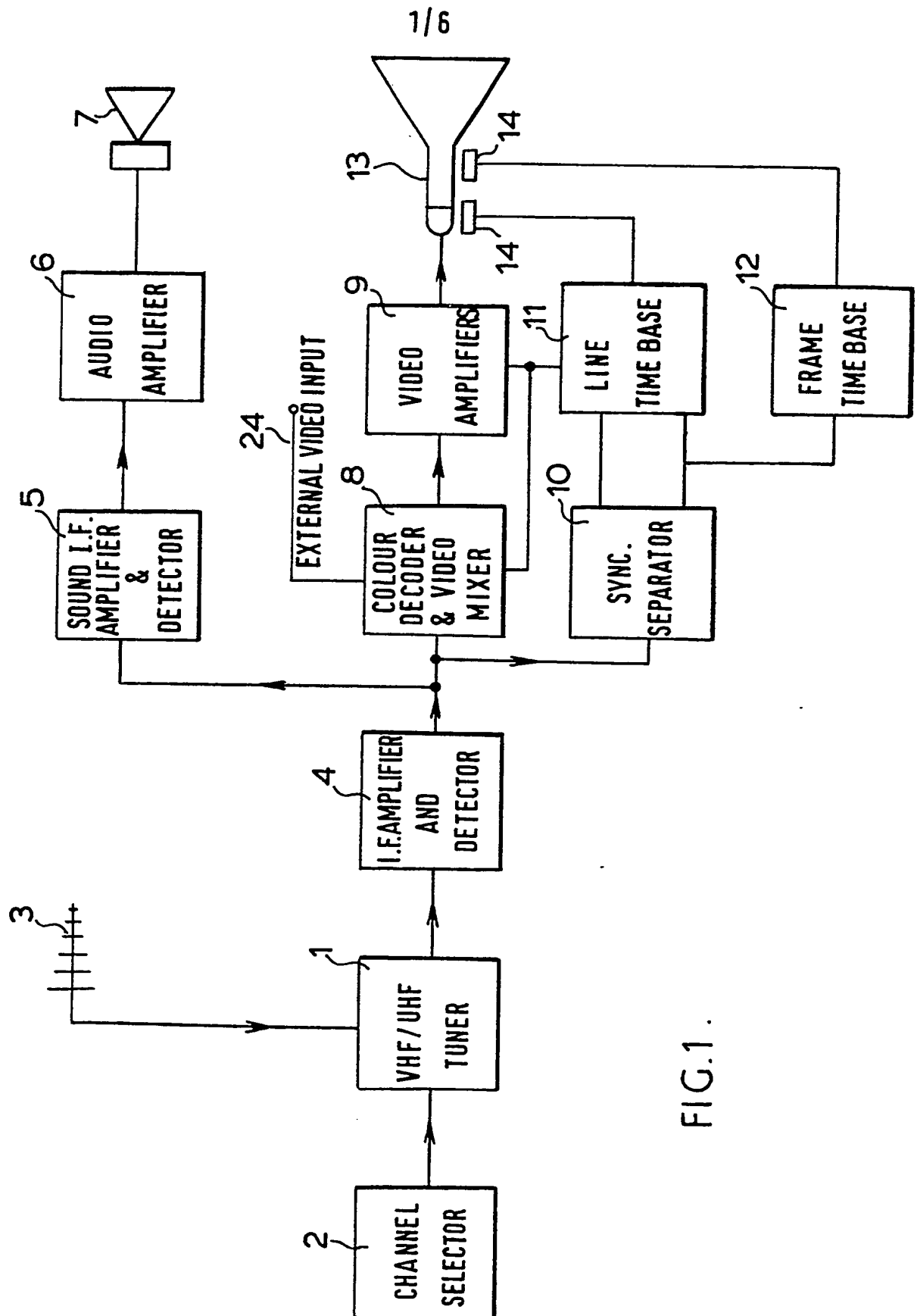
serial bus 25. It will be noted also that the workspace memory 34 could form part of the main system random access memory 43.

## CLAIMS

1. In combination a television receiver including Teletext decoder and display circuitry and a computer, characterised in that the computer is user programmable  
5 and comprises a processor which is connected to communicate with the Teletext display circuit and with the display memory of the Teletext circuitry.
2. A combination as claimed in claim 1, wherein the computer is housed within the same cabinet as the  
10 television and power for the computer is derived from the power supply circuits of the television.
3. A combination as claimed in claim 1 or 2, wherein the television is provided with a remote control unit the keys of which serve as a means for manual entry of  
15 information into the computer.
4. A combination as claimed in any preceding claim, wherein the computer is further connected to supply signals to the audio channel of the television receiver.
5. A combination as claimed in any preceding claim,  
20 wherein the computer is further connected to a read-only memory containing a control program for the acquisition storage and display of Teletext data.
6. A combination as claimed in any preceding claim, wherein the computer serves additionally to provide  
25 control signals for the television display and sound circuits to control volume, brightness, contrast and colour.
7. A combination as claimed in any preceding claim, wherein the user programmable micro-processor is  
30 connected to a parallel data, address and control bus which is further connected directly to the Teletext

display generator, a random access memory and a read-only memory, the Teletext controller being connected to the parallel bus by way of a series-parallel interface, the controller having an independent workspace memory  
5 connected thereto by a further parallel bus.

8. A combination as claimed in claim 7, wherein the first parallel bus is further connected to ports for external peripheral units.



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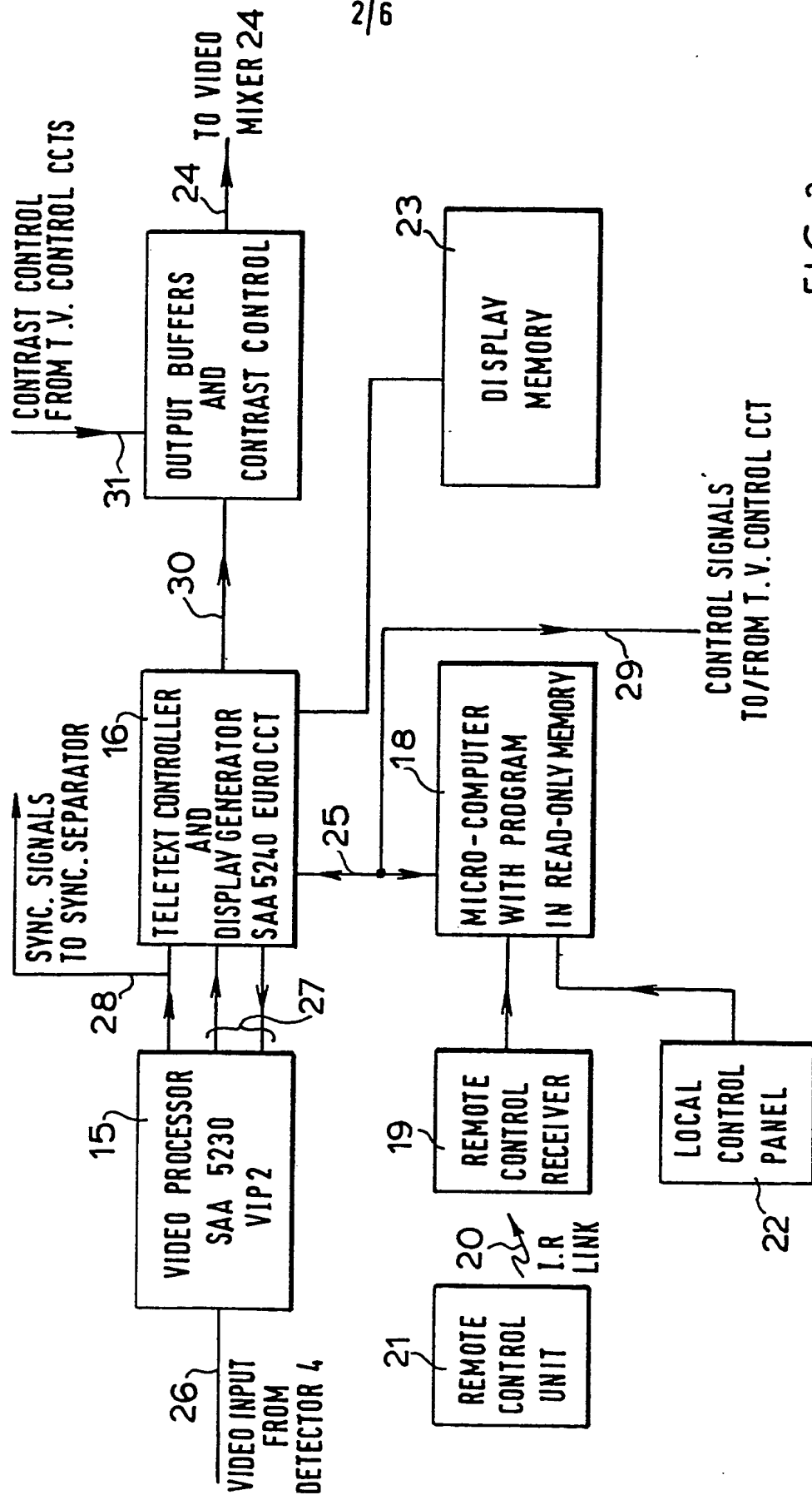


FIG. 2.



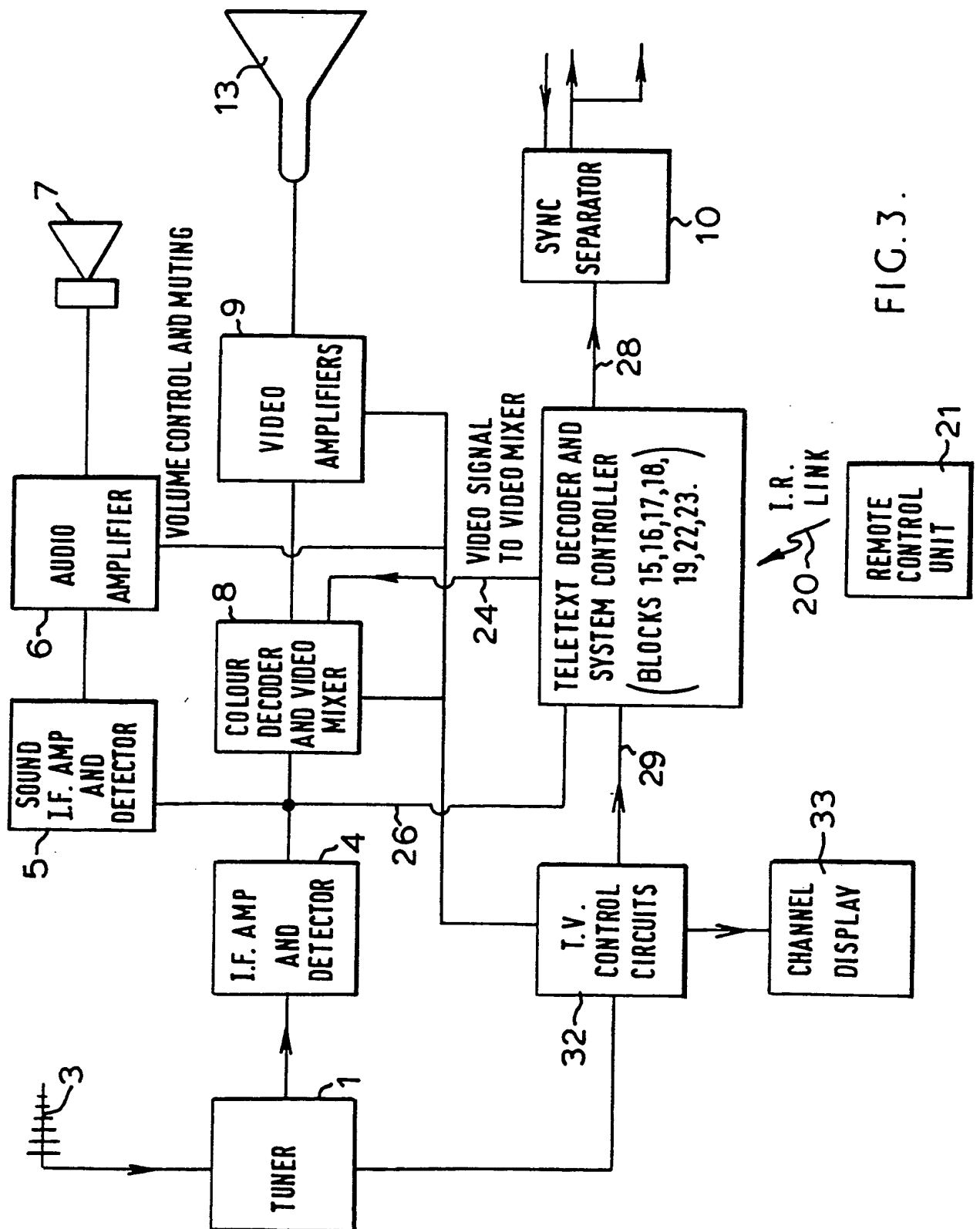


FIG. 3.

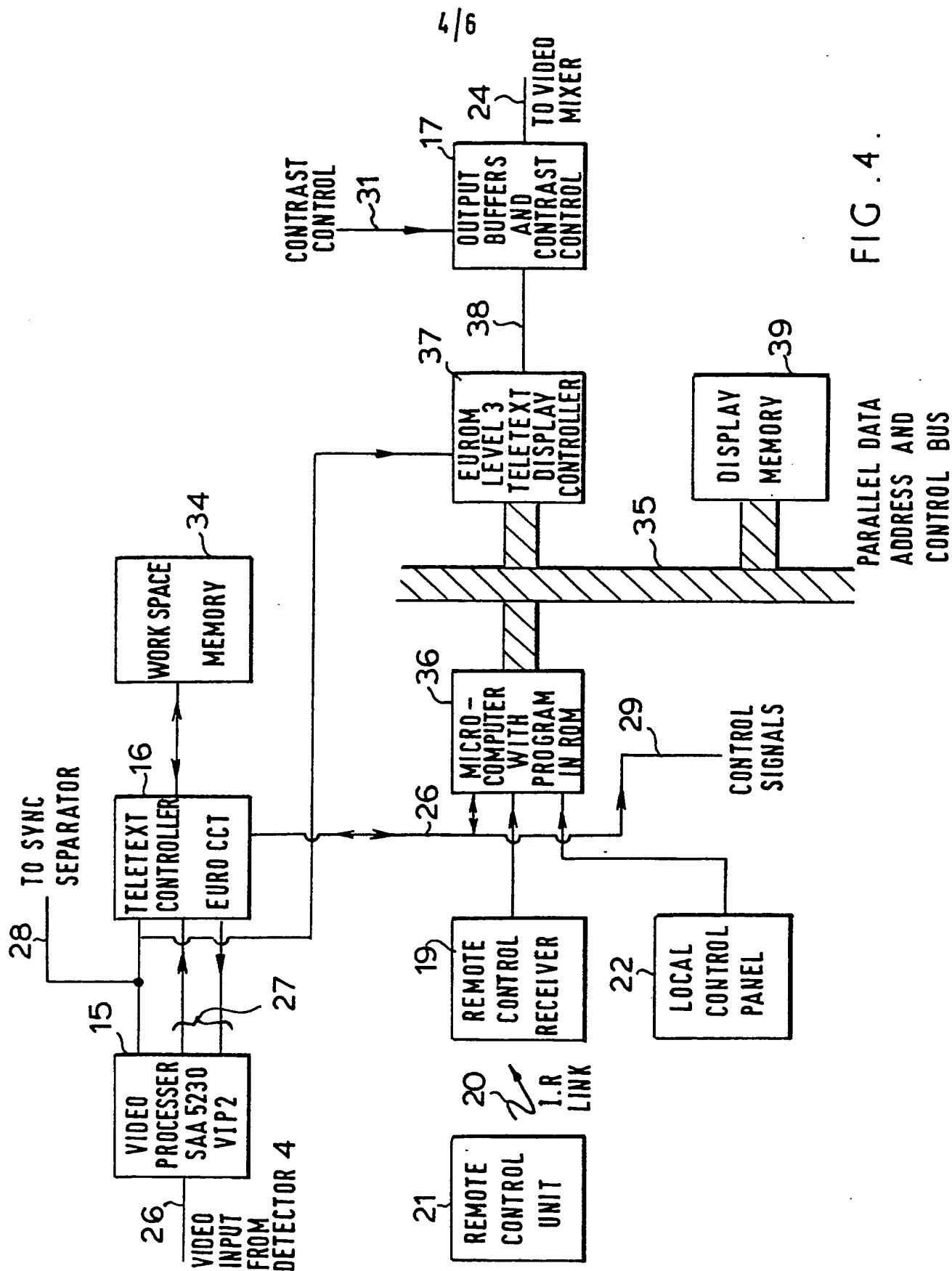
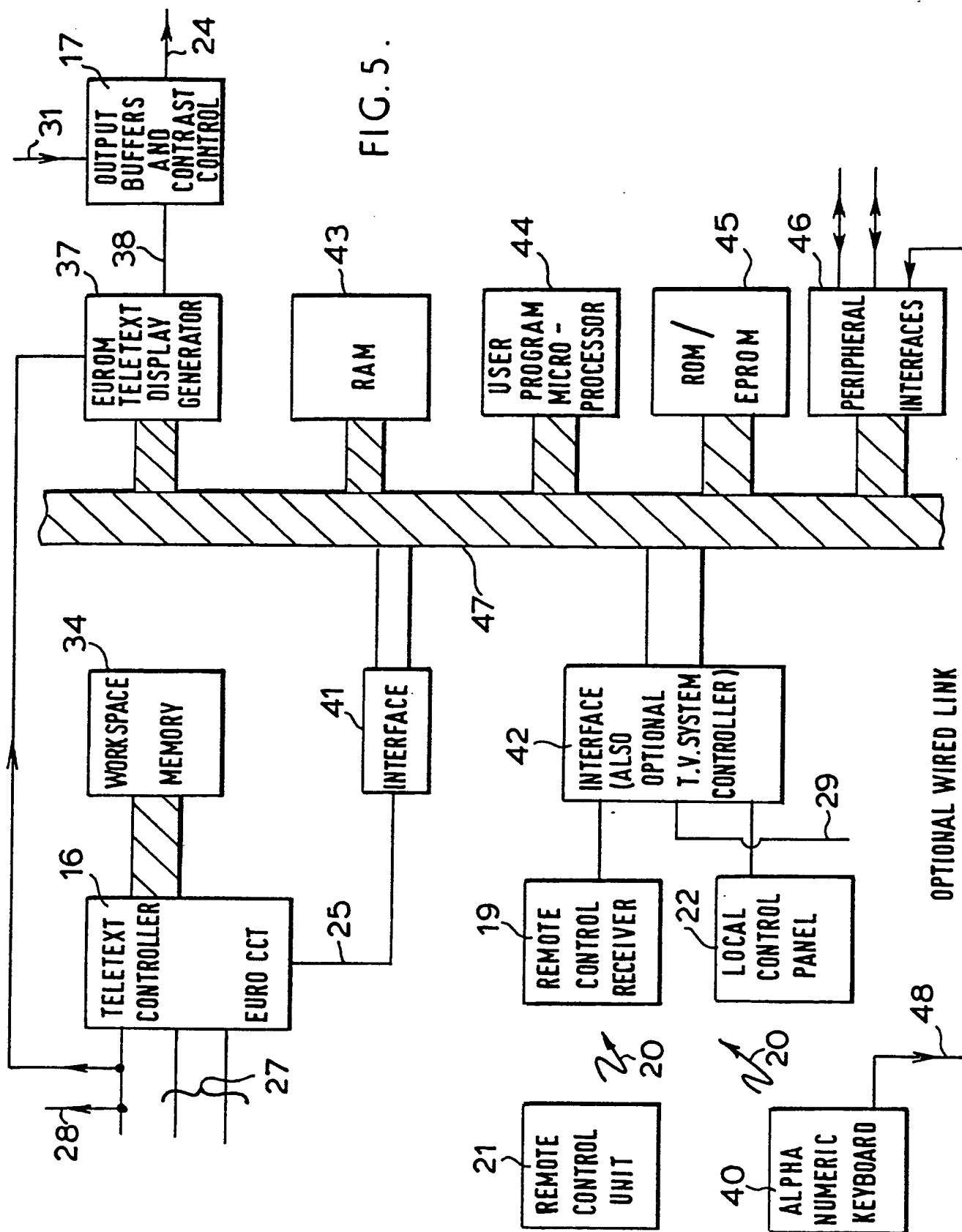
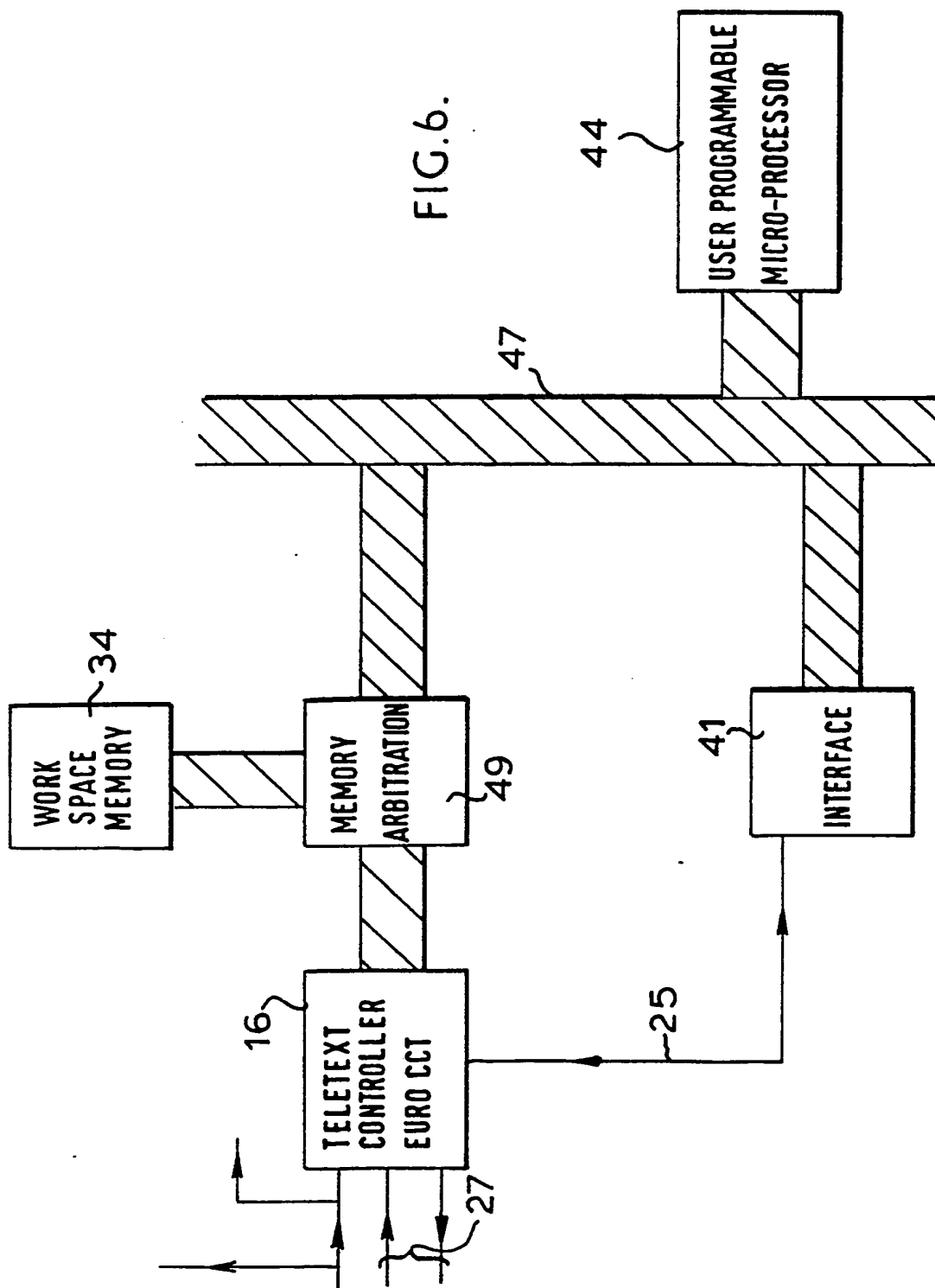


FIG. 4.

5/6



6/6



# INTERNATIONAL SEARCH REPORT

International Application No. PCT/GB 84/00271

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC<sup>4</sup>: H 04 N 5/445

## II. FIELDS SEARCHED

Minimum Documentation Searched <sup>7</sup>

Classification System <sup>1</sup>

Classification Symbols

IPC<sup>4</sup>

H 04 N 5/44; H 04 N 5/445; H 04 N 9/64

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

## III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>5</sup>

Category <sup>6</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	IEEE Transactions on Consumer Electronics, vol. CE-26, no. 3, August 1980 (New York, US) Hedger et al.: "Tele-software-value added teletext", pages 555-566, see page 556, right-hand column lines 1-40; figure 1 --	1
X	IEEE Transactions on Consumer Electronics, vol. CE-26, no. 2, May 1980 (New York, US) K. Karstad: "Microprocessor control for color-TV receivers", pages 149-155 see the entire article --	1,2,3,4,6
X	Patents Abstracts of Japan, vol. 5, no. 192, 8 December 1981; (E85) (864) & JP, A, 56114490 (Sharp) 9 September 1980, see the entire abstract --	1,7,8
A	US, A, 4396941 (K. NISHIMURA) --	1
A	EP, A, 0068422 (INDESIT) 5 January 1983 --	1 ./.

\* Special categories of cited documents: <sup>10</sup>

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

14th March 1985

Date of Mailing of this International Search Report

24 AVR. 1985

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

G.L.M. Kruidenberg

## III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	IEE Proceedings Section AAI, vol. 129, no. 7, part A, September 1982 (Old Woking, Surrey, GB) J.C. MacKellar et al.: "Television receiver design", pages 493-506, see page 501, paragraph 5.2 - page 505, left-hand column, line 5 --	1
A	Electronics International. vol. 54, no. 16, August 1981 (New York, US) T. Fischer: "Digital VLSI breeds next-generation TV receiver", pages 97-103, see page 102, right-hand column, line 20 - page 103, right-hand column, line 22 -----	1

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO.

PCT/GB 84/00271 (SA 7677

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 12/04/85

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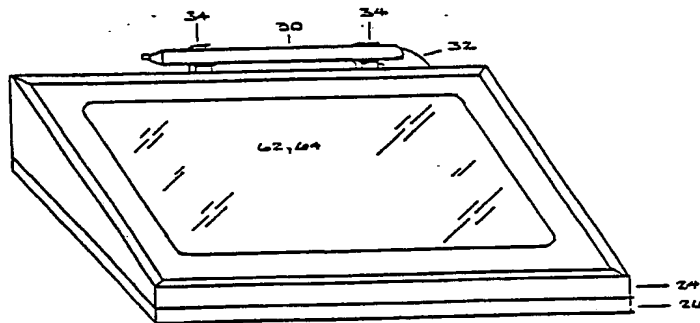
Patent document cited in search report	Publication date	Patent family member(s)	Publicat. date
US-A- 4396941	02/08/83	JP-A- 54149442	22/11/79
EP-A- 0068422	05/01/83	None	



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>4</sup> : <b>G06F 7/04</b>	<b>A1</b>	(11) International Publication Number: <b>WO 89/ 03085</b> (43) International Publication Date: <b>6 April 1989 (06.04.89)</b>
<p>(21) International Application Number: <b>PCT/US88/03344</b></p> <p>(22) International Filing Date: <b>28 September 1988 (28.09.88)</b></p> <p>(31) Priority Application Number: <b>101,729</b></p> <p>(32) Priority Date: <b>28 September 1987 (28.09.87)</b></p> <p>(33) Priority Country: <b>US</b></p> <p>(71)(72) Applicant and Inventor: <b>FOX, James, C. [US/US]; P.O. Box 2354, San Anselmo, CA 94960 (US).</b></p> <p>(81) Designated States: <b>AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent), SU.</b></p>		<p><b>Published</b> <i>With international search report.</i></p>

## (54) Title: AUTOMATIC PROGRAM SELECTOR



TOP 20

FRONT & TOP  
VIEW OF TABLET

## (57) Abstract

An automatic program selector for controlling remote appliances has control responders including a control tablet (20) which employs a viewscreen to display a variety of words and images, and a pointing pen (30) to activate a point-screen (64) which overlays the viewscreen (62) and is coincident with same. By using the control tablet (20) a user may select from numerous pictorial, graphic, and alphanumeric displays, a function a user wishes the appliance to perform. Useful with entertainment appliances, the control can activate command sequences which are readily initiated by the simple act of selecting with the pointing pen (30) a desired program from a guide displayed on the viewscreen. The control tablet (20) alone or in combination with a responding holder (100), automatically issues the correct commands, including channel conversions, for example, to direct appliances to the selected program, or to record programs at a desired time in the future.



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Patent Application Of

James Comins Fox

for

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**Automatic Program Selector**

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**Background -- Field of Invention**

This invention relates to the remote control of appliances, particularly to a remote control device for sophisticated entertainment and other appliances.

**Background -- Description of Prior Art**

Numerous types of remote devices exist for controlling appliances. Hand-held remote control (RC) devices are a particularly popular means for controlling entertainment appliances such as televisions, video-cassette recorders, satellite channel selectors, and the like. The number of command options for each appliance has grown, as has also the variety of appliances which can be remotely controlled.

Certain features are relatively easy to operate using one or more pushbuttons on the face of prior-art RC devices. For example, users find it simple and obvious to adjust audio volume with a RC device having two pushbuttons with respective arrow symbols for UP and DOWN. However, difficulties arise when many different commands are possible since these must be abbreviated. These difficulties are multiplied when a plurality of appliances

must be remotely controlled. Nonetheless, RC devices have become increasingly popular.

Recording machines such as VCRs, now make it possible to save audio or video broadcast programs for viewing at more convenient times. While RC devices can be used to program these machines to select a future time and channel, difficulties arise because the many steps required confuse the average user, so this valuable feature often goes unused.

Similar problems are common with other household appliance controls, such as microwave ovens. One must memorize a code, or abbreviation, or sequence of programming steps. Perhaps the most limiting aspect of all these controls is their reliance on fixed-designation pushbuttons. Any appliance with new command options would require a new control with a different set of pushbuttons. Alternatively, if the pushbuttons have multiple designations, the choice may not be obvious so that the user has to remember which function is assigned to which button. It is for these reasons that the user may acquire several hand-held devices to control several appliances.

A hand-held RC device operable for controlling a plurality of machines is described in patent 4,566,034 to Harger, 1986 Jan 21. While Harger's provides an improved device for controlling the few pieces of equipment for which it is designed, it is again limited to the fixed functions designated on its respective pushbuttons.

Other RC devices are available which have a viewing screen for indicating choices available. However the viewing screen provides a severely limited choice of options, usually for but a single set of commands for a single appliance. Some devices may be available that can be programmed with coded information, but the program choices must be derived from a fixed source whose versatility is severely limited.

### Objects and Advantages

Accordingly several objects and advantages of the present invention are to provide an RC device that can issue many different commands, yet which is very easy to use, which can control multiple appliances, especially TVs, VCRs and the like, which can easily be used to record multiple programs at future times and dates, which does not use fixed-designation pushbuttons, which does not require the memorization of codes, which can use a single device to replace multiple devices, which can be used for controlling complex functions, which can be used to provide an extensive wide variety of choices on its own screen, and which can provide its own set of program choices.

Further objects and advantages are: to provide an RC device with a screen that can be dynamically altered to display all of the controllable functions and status information for an appliance, along with program guide information available for the appliance, to provide a method of controlling the appliance from the RC device, to provide a method of selecting program guide and device control information displayed on the RC device for the appliance, to provide a method for the RC device to receive and store program guide and status information for the appliance, to provide a method of storing in the RC device, program selection information for future viewing and recording on the appliance, to provide a method by which the RC device will allow a user to control similar appliances from different manufacturers in the same way, and to provide a method for controlling a multitude of appliances, with the same RC device, in the manner just discussed.

Further objects and advantages will become apparent from a consideration of the accompanying drawings and ensuing description.

**Drawing Figures**

**Fig 1 is a view of the front and top of an RC device according to the invention.**

**Fig 2a is a view of the underside of the RC device of Fig 1.**

**Fig 2b is a view of the back of the RC device of Fig 1.**

**Fig 3 is a view of the front and top of a holder for the RC device of Fig 1.**

**Fig 4 shows an exploded view of the viewscreen and conductive pointscreen membrane of the RC device of Fig 1:**

**Fig 5 is a pictorial representation of a typical spread-sheet style television program guide displayed on screen of RC device of Fig 1.**

**Fig 6 is a representation of an exemplary select appliance mode menu screen.**

**Fig 7 is a representation of a exemplary compact disk mode selection screen.**

**Fig 8 is a block diagram of circuitry of RC device of Fig 1.**

**Fig 9 is a block diagram of circuitry of holder of Fig 3.**

Fig 10 shows a typical video appliance configuration where the program guide information is read by the holder of Fig 3, through an external medium.

Fig 11 shows a typical video appliance configuration where the program guide information is downloaded from a cable decoder into the holder of Fig 3.

Fig 12 shows an alternate embodiment wherein the television appliance is used to display the viewscreen.

Fig 13 is a flowchart listing of the program loop for the RC device of Fig 1.

Fig 14 is a flowchart of the interrupt background program running in the RC device of Fig 1.

Fig 15 is a flowchart listing of the program running in the holder of Fig 3.

Fig 16 is a modified version of the holder in Fig 3. further including a channel selector for the television system.

#### Drawing Reference Numerals

- 12 aperture formed in mating edges of parts 24 and 26 for emitter 52
- 14 aperture formed in mating edges of parts 24 and 26 for receptor 54
- 18 notch in edge of part 24 for securing strain relief 28
- 20 control tablet
- 22 support frame for control tablet 20

- 24 housing top part of control tablet 20
- 26 housing bottom part of control tablet 20
- 28 strain relief for attachment cord 32
- 30 pointing pen for indicating selections on screen 62
- 32 attachment cord for pointing pen 30
- 34 penholder for pointing pen 30
- 36 pressure sensitive switch on tip of pointing pen 30
- 38 electric contact on tip of pen 30 for position sensing on conductive screen membrane 64
- 39 cursor for displaying position of pen tip on view screen
- 40 access cover for battery compartment 48
- 42 positive electrical contact
- 44 negative electrical contact
- 48 battery compartment
- 50 batteries
- 52 emitter
- 54 receptor
- 60 circuit board
- 62 screen for viewing selections
- 64 transparent, electric conductive membrane that adheres over screen 62
- 100 holder for control tablet 20
- 112 aperture formed in edges of parts 124 and 126 for emitter 152
- 114 aperture formed in edges of parts 124 and 126 for receptor 154
- 118 notch for securing strain relief 134
- 120 joystick with pushbuttons
- 122 support frame for holder 100
- 124 housing top part for holder 100

126 housing bottom part for holder 100  
128 access slot for inserting lasercard 172 into reader 170  
130 line power AC adapter  
132 line power cord  
138 strain relief for cord 132  
142 positive electrical contact from power supply 148  
144 negative electrical contact from power supply 148  
148 power supply  
152 emitter  
154 receptor  
160 circuit board  
170 lasercard reader  
172 lasercard  
180 control tablet memory  
182 control tablet controller circuitry  
184 control tablet screen driver circuitry  
186 control tablet pen position sensors circuitry  
188 control tablet receptor detection circuitry  
190 control tablet emitter driver circuitry  
192 control tablet pen depressed switch detection circuitry  
200 holder controller circuitry  
202 holder memory  
206 holder receptor detection circuitry  
208 holder emitter driver circuitry  
210 video cable/satellite/antenna channel selector  
212 video recorder



- 214 TV set
- 216 video cable connector - input
- 218 video cable connector - output
- 220 selected channel indicator

#### Control Tablet -- Figs 1, 2A, and 2B

Fig 1 shows an RC device in accordance with the invention. Device 20 will hereafter be referred to as a control tablet because it looks like a tablet which occupies a space roughly equal to that of a small open book and would normally be oriented as shown, much like a book laid open on a table. Tablet 20 contains a viewing screen 62 for displaying data. Mounted directly above and over the surface of the viewing screen is a transparent, electrically conductive pointing screen 64, shown in detail in Fig 4. This pointing screen is used with a pointing pen 30 (Fig 1). Both screens are rectangular in shape and of the same size, approximately 21 cm x 33 cm. Both screens are surrounded by a framed area of a top part 24 of the housing of tablet 20. Pointing pen 30 is shown in a penholder 34, which is a clasp in the rear of top part 24 of the housing. The pen has also a durable and flexible attachment cord 32 containing conductors.

As shown in Fig 2A, the underside or bottom 26 of tablet 20 has electrical contacts 42 and 44. These align and mate with similar contacts 142 and 144 of a holder 100, shown in Fig 3. An access cover 40 is also incorporated in bottom part 26. A support frame, a circuit board with circuits, all necessary fasteners and circuit interconnections, which are not shown, but are well known to those skilled in the art, are contained within the the RC device.

Mounted inside tablet 20 are an infrared (IR) emitter 52 (Fig 2B) and an IR receptor 54. These are partly visible at the back of tablet 20 through two apertures 12 and 14, respectively, each formed of mating curved recesses in one edge of each of housing parts 24 and 26. IR emitter 52 is used to send codes for controlling appliances such as TV set 214 or video recorder 212 shown in Fig 10. IR receptor 54 is used to receive program guide information for controlling appliances and also used to receive status information from an appliance.

Also included in control tablet 20 is the circuitry to make the tablet functional. This circuitry is represented in Fig 8. Included in this circuitry is a memory 180 which is used for storing program guide information and appliance status information received from IR receptor 54.

#### Exploded View Of Display And Point Screens -- Fig 4

Fig 4 shows an exploded view of display screen 62 and pointing screen 64. Also shown is a more detailed view of pointing pen 30. Pointing screen 64 is adhered to the top surface of display screen 62 and is transparent and electrically conductive. When conductive tip 38 of pen 30 contacts screen 64, the X/Y position of pen 30 will be determined by an X/Y position sensor circuit 186, shown in Fig 8. If downward pressure is then applied to pen 30, a switch 36 in the pen will be activated. This activation can be detected by a pen depressed switch detection circuit 192, shown in Fig 8.

#### Holder -- Fig 3

Fig 3 shows a holder 100 for storing, recharging and programming tablet 20. Holder 100

has a top or cradle part 124 and a bottom or base part 126. An IR emitter 152 and an IR receptor 154 are shown partially visible through apertures 112 and 114 respectively, formed in the vertical back portion of cradle part 124. When tablet 20 is resting in holder 100, IR emitter 152 and IR receptor 154 mate optically with IR emitter 52 and IR receptor 54, respectively, for transmitting data between holder 100 and tablet 20. So that tablet 20 may be recharged while resting in the holder, electrical contacts 142 and 144 are positioned in the bottom portion of cradle part 124 to align with contacts 42 and 44.

To display updated, current program guide data, the RC device uses a lasercard reader 170, shown in Fig 9, to receive this data from lasercard 172. Lasercard 172 is preprogrammed by etching the data on the lasercard's surface with a laser beam. On a weekly basis, a publisher could compile, manufacture, and distribute on a subscription basis, lasercards that contain this data. Alternately, new lasercards could be distributed in magazines, such as TV Guide.

A lasercard reader access slot 128 (Fig 3) is formed of two mating rectangular recesses along an edge on each of cradle and base parts 124 and 126, respectively. A power cord 132 with an AC adaptor plug 130 is used to supply the power needed to operate holder 100, preferably at a low DC voltage. Inside holder 100 is a circuit board (not shown) containing circuitry shown in Fig 9, including a memory 202 for storing program guide information read from Lasercard 172, discussed previously. Also included in holder 100 is a power supply, a lasercard reader, a support frame, and all necessary internal fasteners and circuit interconnections which are not shown but are well known to those skilled in the art.

Lasercard 172 also contains command signal codes for the entire range of appliances which the RC device is intended to control, e.g. a plurality of makes and models of appliances,

such as TV and VCRs, or a plurality of different appliances, such as coffeemakers and household lights.

#### Operation -- Fig 3

Referring to Fig 3, as stated lasercard 172 containing current program guide information, is inserted through access slot 128 in holder 100 which contains a lasercard reader 170, shown in Fig 9. There is software present in holder 100 to control the lasercard reader. Program guide information is then read automatically from lasercard 172 using the lasercard reader, into a local memory 202, shown in Fig 9. When control tablet 20 is placed in holder 100, the information read from lasercard 172 will automatically be transferred, via IR emitter 152 and IR receptor 54 to the memory 180, shown in Fig 8, of control tablet 20.

Included in lasercard 172 is a special guide containing code information for controlling various appliances that are on the consumer market. This guide contains the information to allow a user to select, from options displayed on screen 62 shown in Fig 1, which appliances will be employed. Using data transfer methods previously described, the appropriate codes used to control selected appliances are transferred to tablet 20 and stored in a non-volatile section of memory 180 shown in Fig 8. This procedure is only necessary the first time the device is set up for use, or when a new appliance is added to a user's system.

#### RC Device Display & Operation -- Figs 4, 5, 6 & 7

Referring to Fig 4, when tip 38 of pen 30 is in contact with pointing screen membrane 64 on viewing screen 62, a group of crosshair lines 39 will appear on the screen at the point that the pen tip and the membrane come in contact. This is used to verify to the user that

the pen is in contact with the screen and to indicate precisely the information on the screen to which the pen is pointing.

To make a selection, one first touches pen tip 38 to pointing screen membrane 64, on viewing screen 62. Next one activates switch 36 in pen 30 by applying downward pressure to pen 30. This causes the selected area of the screen to be activated and a corresponding action to occur.

Available programs and control functions for a given appliance are selected from the options displayed on screen 62. Fig 5 shows a typical spreadsheet style display showing program data arranged by time and channel. Screen control symbols are also displayed. These can be used to find a desired page of information, or section of the spreadsheet. For example the arrows at the bottom and right edges of the display allow one to scroll left or right over the information to display program guides at different times, or up and down to display further channel selections. Making a selection in the area where a particular arrow is displayed selects the indicated direction. A particular day or time can also be instantly displayed by selecting the appropriate box at the bottom of the screen. Finally, a particular mode for controlling a different appliance, or other information to explain to a user how to use the device, can be displayed by selecting the indicated boxes.

For example selecting the section of the screen labeled "TURN DESCRPTN ON", one can cause the display to show movie reviews, episode blurbs, advertisements, and the like. By making a selection in the area where a particular show's title is displayed on the tablet screen, that show will be viewed at the time the show is broadcast. If the show selected is set for a future broadcast, the device would also turn on the appliance at the selected time to remind the user that the selected show is currently being broadcast. If immediately after

making a show selection the user selects the "TURN RECORD ON" area on the display, the recording appliance will be activated to record selected show at selected time, if the user's system has recording capabilities.

When the device is in the "TV SHOW SELECTION MODE", as indicated at the bottom of Fig 5, the making of a show selection will activate the appliance to display the selected show at the selected time. For example, suppose the current time is 9:00 PM on Friday, Oct. 26th 1986. Selecting the Miami Vice box will cause TV set 214, shown in Fig 10, to change to Channel 4. If however, one selects Starman, TV set 214 will automatically be changed to Channel 6 by the control tablet at 10:00 PM. Similarly, one could select many advance programs, even days ahead, up to the programmed limit of lasercard 172, previewing descriptions when desired. The control tablet will also remember selections watched on a weekly basis and will preprogram itself to correspond to the viewing habits of the user. For example, if regularly at 9:00 on Friday the user watches Miami Vice, the control tablet will notice this viewing habit and automatically change the channel to Miami Vice if the TV is on Friday at 9:00 PM. Of course a user could bypass this feature by merely selecting another program to watch.

While actually viewing and/or listening to a particular program, screen 62 will display more conventional controls for functions such as VOLUME UP, VOLUME DOWN, PREV SONG, NEXT SONG and STOP PLAYER as shown in Fig 7. If transmitting appliances are available, control tablet 20 can receive information from certain of these appliances and display it on screen 62. Referring to Fig 7 for an exemplary screen display, a compact disc player could transmit content and selection descriptions of songs available for display on the tablet.

To change modes, one would select the "CHANGE MODE" area on screen 62. This would cause the display to show a "SELECT APPLIANCE MODE" menu. A exemplary representation of this menu is shown in Fig 6. This display can have different information than that shown, depending on the configuration of the system. To change the mode to a different appliance, one would select the area on the screen that corresponds to the appliance the user wishes to use.

Since only the available control selections for an appliance will be displayed at any given time, available selections will be simplified and become more obvious. Unused functions that can cause confusion to the user, will not be displayed. Program guide choices and descriptions for an appliance are readily available for display. A user can easily make program guide choices from the selections shown on the display.

The RC device makes controlling an appliance fun and easy. There are no buttons to push or codes to memorize. Vast amounts of information can be instantly displayed and command choices are obvious. Similar appliances are controlled in the same manner. If a user employs a system different than the one they have, the new system would be controlled in the same manner that they would control their system. There is no need to learn how to operate a new remote control. Since program guide information is stored in the RC device, there is no need for the typical printed guide, which can easily be misplaced.

#### Control Tablet Circuitry -- Fig 8

The internal construction of the control tablet and charger/cardreader will now be described in detail.

Referring to Fig 8, control tablet 20 consists of eight circuit blocks whose functions are as follows:

1. A controller 182 to process the data needed to make the control tablet functional. This circuit would typically be a single chip microcomputer.

2. A memory 180 to store the data to make the control tablet functional. This memory is connected to controller 182 and is divided into three groups as follows:

- A. An Electrically Erasable Programmable Read Only Memory (EEPROM) is a permanent, but alterable memory for storing configuration information. Alternatively, one could use a battery back up Read And write Memory (RAM), often imprecisely called a Random Access Memory.

- B. A Programmed Read Only Memory (PROM) is used to store the microcode instructions that controller 182 uses to process the data.

- C. A data RAM is used for storing program guide data and as a scratchpad memory for controller 182.

3. A screen driver 184 is connected to controller 182 and consists of circuitry needed to activate viewing screen 62 so that program guide information and appliance control selections can be viewed.

4. A pointer position sensor circuit 186 is connected to controller 182 and is used to translate the X/Y position of pen 30 into a form that the controller 182 can process. This cir-



cuit will apply a voltage across position screen membrane 64 alternating across the horizontal plane, then vertical plane. Pen tip 38, when in contact with membrane 64, will detect a voltage drop that corresponds to the pen position on the membrane. Circuit 186 will then translate the detected voltage into an actual position that the controller 182 can understand.

5. A circuit 188 detects data at IR receptor 54 so that controller 182 can process the received information from external devices. This circuit consists of a voltage comparator that detects a voltage from the IR receptor when it is activated.

6. A circuit 190 enables controller 182 to drive IR emitter 52 to transmit information to external devices. This circuit consists of a transistor that drives IR emitter when activated.

7. A circuit 192 enables controller 182 to detect activation of position pen switch 192.

8. Hardware to supply power to control tablet 20. This consists of a rechargeable battery, a battery compartment 40, and a pair of battery recharger pads, 42 and 44.

Circuitry also includes all of the interconnections between above mentioned circuits to make the tablet functional.

#### Holder Circuit -- Fig 9

Fig 9 shows circuitry for holder 100. It consists of five circuit blocks whose functions are as follows:

1. A controller 200 to process the data needed to make the holder functional. This controller would typically be a single chip microcomputer.

2. A memory 202 to store the data to make the holder functional. This memory is divided into two groups as follows:

- A. A PROM is used to store the microcode instructions that controller 200 uses to process the data.

- B. A data RAM is used for storing program guide data and scratchpad memory for controller 200.

3. A circuit 206 detects data present at IR receptor 154 so that controller 200 can process information received from external devices. This circuit consists of a voltage comparator that detects a voltage from the IR receptor when it is activated.

4. A circuit 208 used so that controller 200 can drive IR emitter 152 to transmit information to external devices. This circuit consists of a transistor that drives IR emitter when activated.

5. A circuit 204 that enables controller 200 to access the program guide information stored on lasercard 172. This circuit consists of an integrated circuit the manufacturer of the lasercard reader supplies for interfacing lasercard readers to controllers.

6. A power supply 148 to supply power to holder 100. This includes power cord 132 and plug 130 for connection to external power source. Also included are a pair of recharger

pads 142 and 144 to recharge control tablet 20.

#### Configuration Of The System -- Fig 10

The configuration or layout for a typical complete video system consisting of a TV, VCR, etc. is shown in Fig 10. Control tablet 20 and holder 100 can be mated and separated. As stated, the program guide information is read by the holder by the lasercard reader. In this configuration holder 100 is a stand alone unit which is not directly connected to the system. In this configuration decoded video signal output from a video cable/satellite/antenna channel # selector is input into video recorder 212. The video signal from video recorder 212 is supplied to TV set 214. Control tablet 20 sends codes that control the channel selector, video recorder, and TV set, and receives program guide information from holder 100.

#### Alternative Configuration Of The System -- Fig 11

Fig 11 illustrates a typical video equipment cable interconnection with control tablet 20 and holder 100 where the program guide information is downloaded from video cable/satellite/antenna channel # selector system 210. Program guide information is encoded and decoded on a selected channel by methods currently used to display text during "Closed Caption" broadcasts for the hearing impaired. Since program guide data is downloaded through a video connection, there is no need for a lasercard or lasercard reader. This configuration has the advantage that if the program guide is changed at the last minute, e.g., for an emergency news flash, the information can be instantly downloaded and updated in the control tablet. Appliance interconnections would be identical to those described in Fig 10, except that holder 100 would be connected so that it would input the

video signal output from channel decoder 210, and the video signal output from the holder would be the input into video recorder 212.

#### **Alternative Pointing Methods -- Fig 12**

The preferred embodiment described above has a screen incorporated in the control tablet. Other variations are possible. For example as shown in Fig 12, a joystick type control 120 could be employed to move a cursor on a display shown on the viewing appliance. Operation would proceed as above, except that the user would have to use the joystick and a pushbutton to move the cursor and make selections rather than the pen method previously discussed. Selection information would be displayed on the TV set, rather than the display in the RC device. With this configuration holder 100 has character generation circuitry used to build the screens on the TV set that are normally displayed on tablet 20.

#### **Optional Embodiment Combining Holder & Channel Decoder -- Fig 16**

An optional embodiment of the holder of Fig 3 is shown in Fig 16. In this configuration holder 100 also incorporates channel decoder 210 in its housing. Mounted on the surface of this holder is a video connector 216, for receiving the undecoded signal and a video connector 218, for supplying the decoded signal to TV set 214. Also incorporated is a channel indicator 220, this to displays the current channel being decoded.

#### **Control Tablet Flowchart -- Fig 13**

A flowchart in Fig 13 represents the main loop of the control tablet program which is stored in PROM 180. Basically the program loops through the following steps:

1. Update display to show possible selections.
2. Determine if the pointing device is being used. If the pointing device is not being used, then flag that it is not being used by a return to Step 1.
3. Flag that the pointing device is being used. Determine if a selection is being made. If a selection is not being made then return to Step 1.
4. A selection has been made so execute the action that corresponds to the position of the pointing device, then return to Step 1.

The following is a detailed explanation of the blocks in the flowchart. The remaining operations are self-explanatory and will be easily understood by one skilled in the art.

Block 50 (Init) represents a one time initialization step that starts off the flow chart. Here variables are initialized and configuration information is selected.

Block 52 (Display Screen) represents a step, in which the display is updated with information pertinent to the current mode and selection information. It displays the cursor if the pointing device is being used.

Block 54 (In Holder?) represents a decision which the system determines whether the control tablet is in the holder. If it is not in the holder then the system will continue operation at block 58.

Block 56 (Download Data) represents a step in which program guide information is received by the tablet from the holder. The system then continues operation at block 52.

Block 58 (Pointer Used) represents a decision which the system determines if the pointing device is being used. If the pointing device is being used then the system will continue operation at block 62.

Block 60 (Cursor Off) represents a step that flags the pointing device is not being used so that the cursor will not be shown on the display. The system then continues operation at block 52.

Block 62 (Cursor On) represents a step that flags that the pointing device is being used so that the cursor will be shown on the display.

Block 64 (Is Selection?) represents a decision which the system determines if a selection is being made. If no selection is being made then the system continues at block 52.

Block 66 (Find Position) represents a step that determines the position of the pointing device.

Block 68 (Do Selection) represents a block determines which appropriate action block 70 through 92 will be executed by the position determined in block 68. The system then continues at block 52.

The following blocks, 70 through 92, detail the routines that can be executed from block 68.

Block 70 (Program Selection) represents a make program selection routine. This routine is called if a selection is made in the spread sheet program guide area of the display. This routine determines on what show the cursor is located and flags that program guide selection to be displayed at the appropriate time. The actual changing of the channel is done in Fig 14 during a timer interrupt routine.

Block 74 (Change Date) represents a change date to display routine. This routine is called if the pen tip is depressed on the screen above the date bar. The program determines what date that they want to display the guide for and saves it in memory so the next time the screen is displayed the program guide for the selected date is displayed.

Block 76 (Change Time) represents a change time to display routine. This routine is called if the pen tip is depressed on the screen above the change time bar. The program determines what time is selected and saves it in memory so that when the next time the screen is displayed the program guide for the selected time is displayed.

Block 78 (New Window) represents a change the vertical selection window routine. This routine is called if the pen tip is depressed on the screen above the vertical scroll bar which is located directly to the right of the guide display. If there are more channel selections then can be displayed on the screen at one time, the program determines where to center the window by the position of the pen in the bar and saves it in memory so that the next time the screen is displayed it displays the selected channels in the program guide selection area.

Block 80 (Volume Up) represents a send volume up routine. If the pen tip is depressed on

the screen above the volume up arrow then the control tablet will start sending volume up commands to the TV until the pen tip is let up.

Block 82 (Volume Down) represents a send volume down routine. If the pen tip is depressed on the screen above the volume down arrow then the control tablet will start sending volume down commands to the TV until the pen tip is let up.

Block 84 (Mute Toggle) represents a send mute command routine. If the pen tip is depressed on the screen over the mute icon then the control tablet will send the mute command to the TV. If the TV is already muted the program will send the mute off command.

Block 86 (Help Toggle) represents a toggle help mode routine. If the pen is depressed on the screen above the help icon then the control tablet toggle will turn on the help feature if the help feature is off and turn it off, if on.

Block 88 (Record On) represents a record mode routine. If the pen is depressed on the screen above the record icon then the video recorder will be flagged to record the program selection.

Block 90 (Description Toggle) represents a toggle program description mode routine. If the pen is depressed on the screen above the description icon then the control tablet will toggle the description mode flag. If the flag is on when a guide selection is selected then a detailed description of the selected program will be displayed on the screen. If the flag is off then the tablet would not display that information.

Block 92 (Appliance Selection) represents a go to appliance selection menu routine. If the



pen tip is depressed on the screen above the go to appliance menu icon, then this causes the mode of the tablet to be changed so that a menu will be displayed. You could then choose another appliance, i.e. compact disk player, etc...

#### Background Program Task Flowchart -- Fig 14

A flowchart in Fig 14 represents the background program task, stored in PROM 180, that is executed during a timer interrupt. This routine is run on a regular basis and does all the switching of the TV, VCR, etc. The steps that happen during that interrupt are described as follows:

Block 100 (Adjust Time) represents a routine that adjusts for the time of day by incrementing the time variables.

Block 102 (Is Channel Set) represents a decision that determines if the channel being watched for the current time is the channel desired. If so then the program continues at block 106.

Block 104 (Change Channel) represents a routine that actually changes the channel.

Block 106 (Should VCR Be Recording) represents a decision that determines if the VCR should be recording and is not. If the VCR is recording then the program continues at block 110.

Block 108 (Turn VCR On) represents a routine that turns on the VCR and starts it recording.

Block 110 (Data At Receptor) represents a decision that determines if data is present at the IR receptor. If no data is present then the program continues at block 114.

Block 112 (Store Data and Take Any Necessary Action) represents a routine that stores the data received at the IR receptor. The program will then take an appropriate action to flag the main program that data was received.

Block 114 (Return From Interrupt) represents a routine that restores the program environment, then returns control back to the main loop program.

#### Holder Flowchart -- Fig 15

The flowchart in Fig 15 represents the program loop, stored in PROM 202, running in holder 100. It is a simple program whose description is as follows.

Block 150 (Init) represents a one time initialization routine. Here variables are initialized and the program environment created.

Block 152 (Lasercard Present) represents a decision that determines if a lasercard has just been inserted into the lasercard reader. If no lasercard is present then the program continues at block 156.

Block 154 (Read Lasercard) represents a routine that reads in the necessary information off the card and stores it in the holder's internal memory.

Block 156 (Tablet In Holder) represents a decision that determines if the control tablet is positioned in the holder. If the tablet is not in the holder the program returns to block 152.

Block 158 (Download Data) represents a routine that downloads program data stored in the holders memory to the tablet. The program then returns to block 152.

#### **Summary, Ramifications, & Scope -- Control Tablet**

As previously described, the RC device basically incorporates a TV guide, a screen for displaying the TV guide, and a pointing device for making selections from such guide. Images composed of words for descriptions and symbols for representing commands can be displayed on the screen. Commands are grouped in sets which are not all shown at once. Each set, or menu, contains a group of commands appropriate for a selected appliance. Also included in each group are commands for changing from menu to menu. Symbols as well as command descriptions can be used to represent commands, and can be tailored to suit the individual user. For example if the device were to be in the command mode for adjusting a graphic equalizer for an audio system, the screen may display the current settings in the familiar bargraph form that the user is accustomed to. To change a setting, one would simply select the bar one desires and slide it up or down to the desired position. Only the commands pertinent to a particular mode are displayed at one time, reducing confusion. Detailed descriptions can be displayed to inform the user of the command function. By using the screen in the above described fashion, commands to control similar appliances from different manufacturers are displayed in the same manner. This allows for uniform control of appliances from system to system.

Another feature of the RC device is automatic program selection and recording. Enter-

tainment programs in a guide are displayed, typically in a spread sheet fashion, as well as with full program content descriptions. To view a show the user need merely select an area on the screen displaying that show's title. Automatically, the necessary commands will be generated and transmitted from the control tablet to the appropriate receiving appliances. The appliances respond in the ordinary manner as when directed by the original pushbutton control.

The RC device is especially useful with cable television selectors. Quite often the channel selected on the cable box is not the actual broadcast channel that you may wish to watch. Often one must use a separate table of broadcast channel numbers to convert to the actual cable channel numbers you wish to select. Since many cable channels, e.g. Showtime, don't have broadcast channel numbers so the cable channel numbers have to be memorized. Using the RC device of the present invention eliminates these problems. When a selection is made for a desired program, the control tablet makes the conversion or selection automatically and issues the correct command.

Since program selections are displayed on the screen of the RC device, a user does not have to have the typical printed version of the printed program guide, which is easily misplaced. A user may need to have this printed version of the program guide in order to operate some RC devices properly. These RC devices do not provide for channel conversions or display of program selections. They also work with VCR's only and are still complicated to use.

#### Summary, Ramifications, & Scope -- Uses With Recording Appliances

When an appliance has the ability to record video or audio medium, it can be confusing to a user to select a channel, start record time, and stop record time for the recording ap-

pliance. The present RC device has a simple solution to this problem. One need merely activate the desired selection from the program guide displayed on the viewscreen for a selected appliance. Then the user informs the RC that the user wishes to record that program selection. This is done by activating the "TURN RECORD ON" function selection on the viewscreen. The RC device would then send the appropriate signals to the recording appliance at the appropriate time so that the program selected would be recorded. This would also allow recording of future selections even if the recording appliance does not have the ability to be programmed to record at a future time. In such a case, the RC device would wait until the time selected for the desired program, then start the recording appliance to record from the desired channel. The RC device would then turn off the recording appliance when the program selected is done.

The previously mentioned feature can also be used fix another problem that exists with most programmable recording appliances. That is the ability to record multiple selections at different times. The RC could solve the problem of having to decide which soap opera the user wants to record while at work. The RC would control the recorder so that both shows were recorded properly.

#### **Summary, Ramifications, & Scope -- Holder and Transmitting Appliances**

Additionally, appliances with transmitting capabilities can send information to the control tablet. One such appliance is a holder for the control tablet the combines a battery charger and a lasercard reader. Current program information stored on a lasercard and read by the reader when the card is inserted in the reader. This information is transfered by IR transmission to the control tablet.

A special guide included with the program guide information on the lasercard contains information for possible different configurations of appliances. The control tablet is initialized for the user's particular models of appliances, when the user completes the selections directed by the special guide. This procedure would only be required before the first use of the appliances or control tablet, or when an appliance is changed or added. The special guide information would also be updated, in successive lasercard issues, when necessary for initializing any new appliances which comes to the market.

Other transmitting appliances could send various status information to the tablet such as current channel, elapsed time, etc. Recorded formats loaded into transmitting appliances could send their program content to the tablet for automatic selection in a similar manner as described above. For example, upon insertion of a compact disk into a compact disk player, the song titles and order may be transmitted to the control tablet. The control tablet will memorize this data and display it on the screen when the compact disk mode is selected. One would select the songs titles in the order desired to be listened to and the tablet would then program the compact disk player to play the songs in the order selected.

#### **Summary, Ramifications, & Scope -- Optional Embodiments**

While the preferred embodiment employs a lasercard reader in the holder for acquiring guide updates, other methods may be used for receiving program information. For example, one could use a floppy disk reader or download such information over telephone lines or use a transmission channel by either cable or wireless means, including by satellite. Also, numerous means could be used in place of, or in addition to, the infrared laser emitter and receptors shown in the preferred embodiment. These means could be microwave, radio, carrier current or direct wirelink.

It should be noted that the screen does not need be built into the control tablet. It is possible to use the screen on the television to display the guide and selection information. This has disadvantages due to the fact that in order to control an appliance, the user must be in viewing range of a television. The user also must have a television in the first place. Also, if the user is using the television display to show television selection decisions, the displayed information may impede with the television selection currently being viewed.

It may be noted that many different pointing devices could be used instead of a pen. These may include joysticks, lightpens, optical and mechanical mice, and possibly eye position sensors, that register what the eye is looking at.

Finally, other equipment, including telephone accessories, heating and ventilating controls, kitchen appliances and the like, can be controlled by the tablet described above, so long as the equipment has the appropriate receiving apparatus. Having on the tablet screen a plan view of a room, for example, one could represent symbolically each light, appliance, or piece of equipment in that room. Using the pointing pen one could point to a desired temperature on a symbolic thermometer to control heating, turn a light symbol on or off to control a fixture, move the hands of a clock on a coffee pot picture to set the start brewing time, and so on.

The automatic program selector is easy to use and versatile. It vastly reduces confusion, and provides helpful information on demand. Large amounts of information are accessible, numerous control options for a plurality of appliances are available, and the display is in smaller amounts that are more clear and understandable. Selection by the guide in the control tablet eliminates many intervening and frustrating steps, otherwise necessary with

ordinary hand-held remote controls.

While the above description contains many specificities, the reader should not construe these as limitations on the scope of the invention, but merely as exemplifications of preferred embodiments thereof. For example skilled artisans will readily be able to change the dimensions and shapes of the various embodiments. They can use many other display devices other than those discussed. They can use many other pointing methods then those discussed. They can use many other methods to receive program guide and appliance status information then those discussed, and they can use many other methods for controlling an appliance then those discussed. Accordingly the reader is requested to determine the scope of the invention by the appended claims and their legal equivalents, and not by the examples given.



**Claims**

1. A remote control for enabling a user to control at least one electronic device, comprising:
  - a first housing,
  - a viewing screen in said first housing for symbolically displaying a variety of available choices for a controllable electronic device,
  - pointing means in said first housing for selecting one of said choices on said viewing screen,
  - means in said first housing for interpreting the selections made and for generating corresponding display information and corresponding transmission information for said controllable electronic device, and
  - transmitting means in said first housing for sending an appropriate command, representing the selection made, to said controllable electronic device,
  - receiving means in said first housing for receiving, from an external source, program guide information for use with said controllable electronic device,
  - means for storing and retrieving program guide information, and
  - means for displaying and selecting said stored and retrieved program guide information.
2. The remote control device of claim 1, further including energy storage means in said first housing for supplying operation power to subsequent elements in said first housing.
3. The remote control device of claim 1, further including means for charging said energy storage means.
4. The remote control device of claim 1, further including:

a second housing,

receiving means in said second housing for receiving, from an external source, program guide information for use with said controllable electronic device,

transmission means in said second housing for transmitting said program guide information to said remote control device, and

means for enabling said remote control device to receive and transmit program guide information.

5. The remote control device of claim 4, further including channel selection means in said second housing for use with said controllable electronic device.

6. The remote control device of claim 1, further including:

receiving means in said housing for monitoring changeable conditions transmitted by said controllable electronic device, and

means for displaying the resultant monitored conditions.

7. The remote control device of claim 1 wherein said device contains means for controlling a plurality of said controllable devices by sending the appropriate commands to the desired said controllable device.

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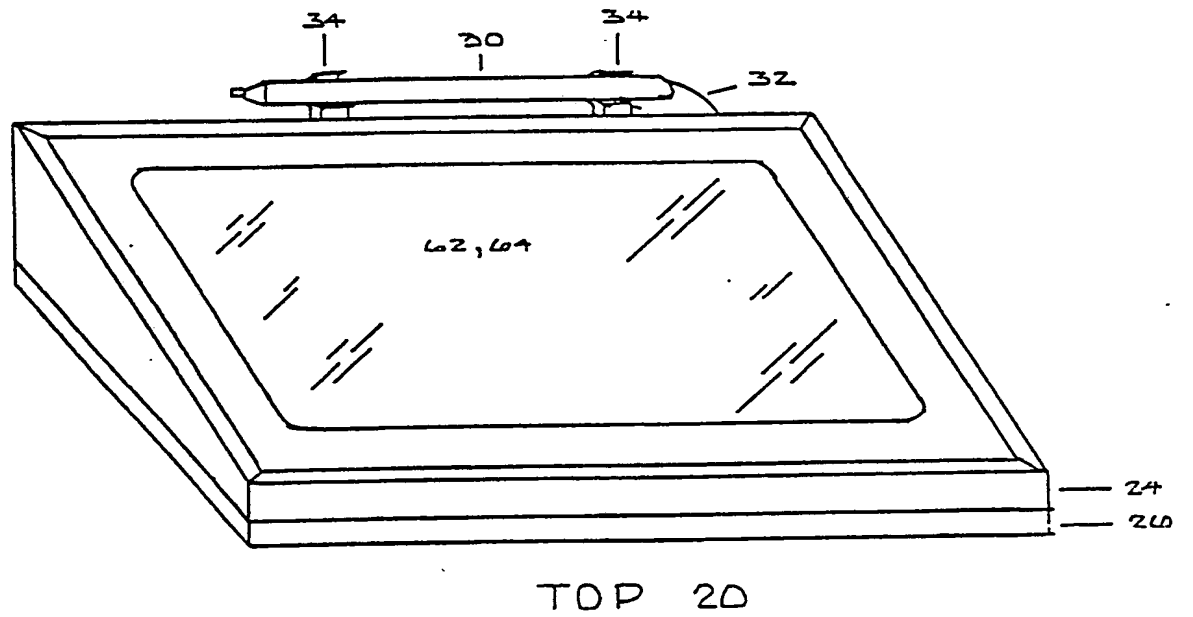
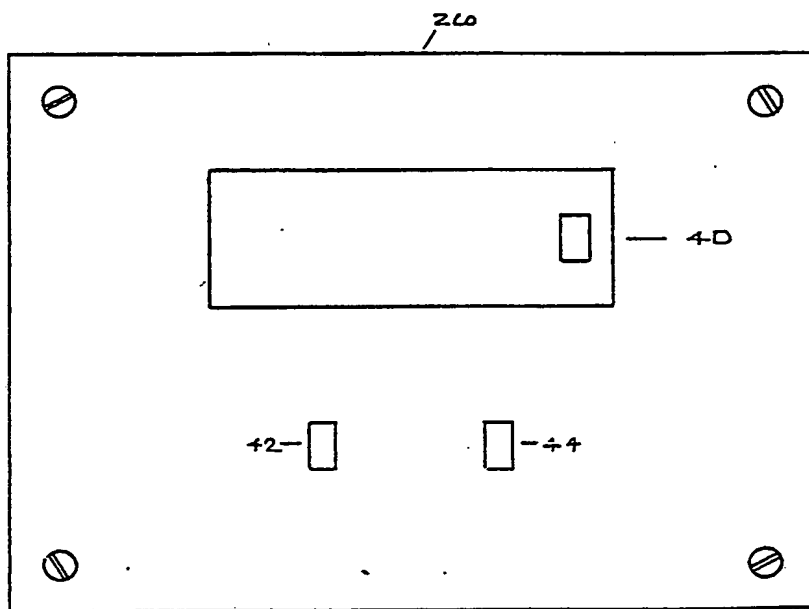


FIG. 1  
FRONT & TOP  
VIEW OF TA

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BOTTOM

FIG. 2A  
BOTTOM VIEW  
OF TABLET

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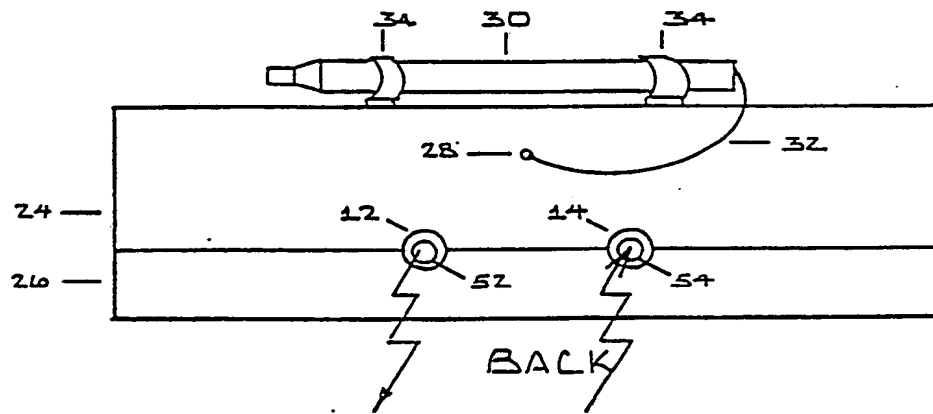


FIG. 2B  
BACK VIEW  
OF TABLE

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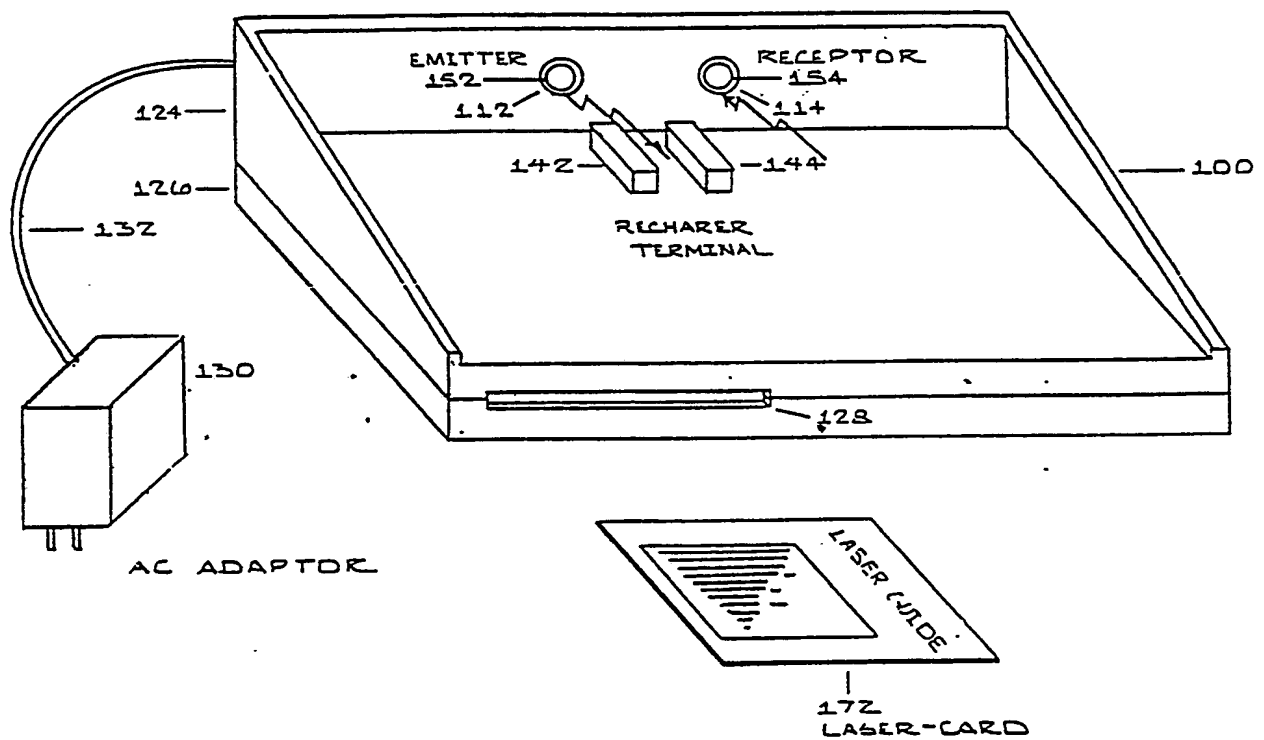


FIG. 3  
CHARGER / CARD READER

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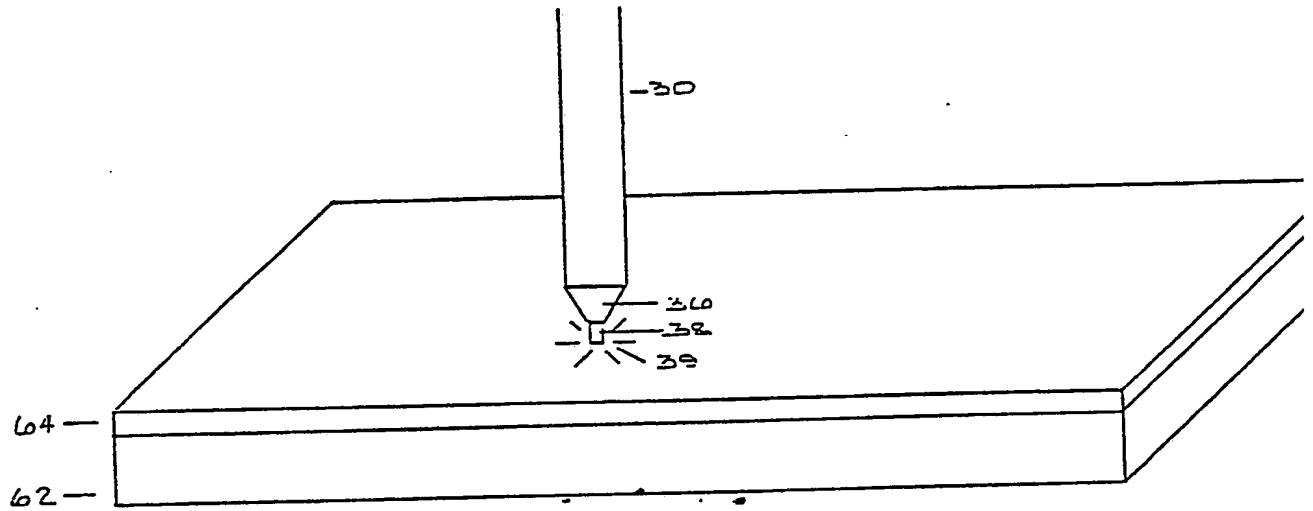


FIG. 4  
EXPLODED VIEW  
OF DISPLAY  
POINT ASSEMBLY

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Current : Friday, Oct. 24, 1986 09:00 PM Channel 4 KRON San Francisco  
Miami Vice

	8:30	9:00	9:30	10:00	10:30	11:00
2	MOVIE: The Burning Bed '84 *** Farrah Fawcett, Paul LeMat			News		Late Show
3	A-Team	Miami Vice		LA Law		NEWS
4	A-Team	Miami Vice		LA Law		NEWS
5	Great Pumpkin	Dallas		Falcon Crest		NEWS
6	Wall Street	Great Performances		Hungary		NOVA
7	Belvedere	Hammer!	Sidekicks	Starman		NEWS

AM	PM	1	2	3	4	5	6	7	8	9	10	11	12
Sun	Mon	Tues	Weds	Thur	Fri	Sat							

CHANGE MODE

Current Mode : TV Show Selection

TURN HELP ON

TURN RECORD ON

TURN DESCRIPTN ON

TURN MUTE ON

UP

DOWN

VOLUME

FIG. 5  
T.V. APPLIANCE  
SELECTION



Select Appliance Mode

TV Show Selection
Compact Disk Player
VCR

TURN  
HELP  
ON

Current Mode : Appliance Selection

FIG. 16  
APPLIANCE SELECTION  
SCREEN

Friday, Mar. 24, 1986 09:00 PM  
Current CD : Graceland - Paul Simon

1. The Boy In The Bubble 3:59	7. Under African Skies 3:34
2. Graceland 4:48	8. Homeless 3:45
3. I Know What I Know 3:13	9. Crazy Love. Vol II 4:17
4. Gunboats 2:42	10. That Was Your Mother 2:51
5. Diamonds On The Soles Of Her Shoes 5:34	11. All Around The World 3:15
6. You Can Call Me Al 4:39	

Current Song : The Boy In The Bubble

CHANGE MODE

Current Mode : Compact Disk Selection

TURN HELP ON

START SELECTION

UP

DOWN

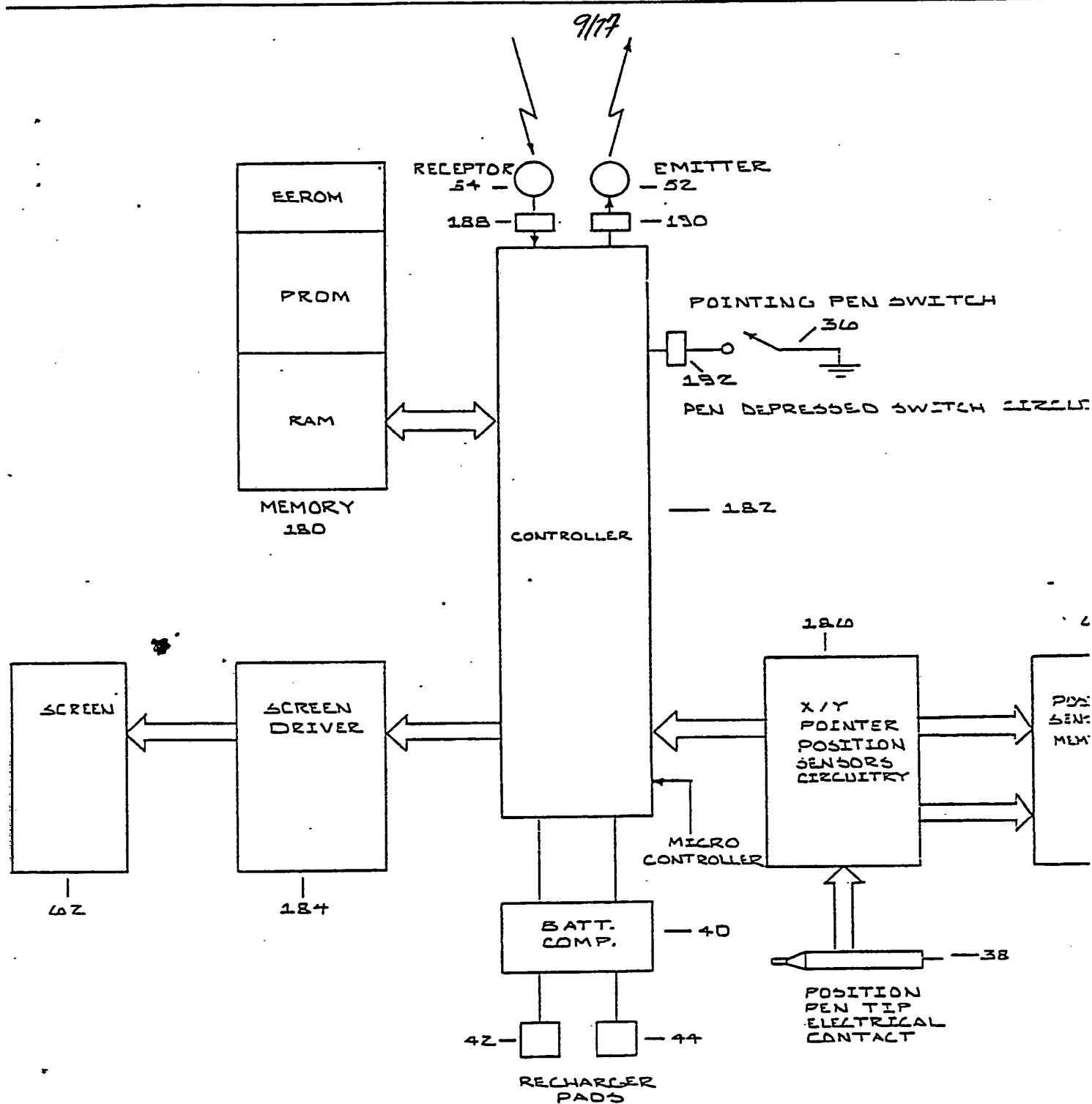
VOLUME

STOP PLAYER

PREV SONG

NEXT SONG

COMPACT DISK  
APPLICATION SCREEN

FIG. 8  
CONTROL

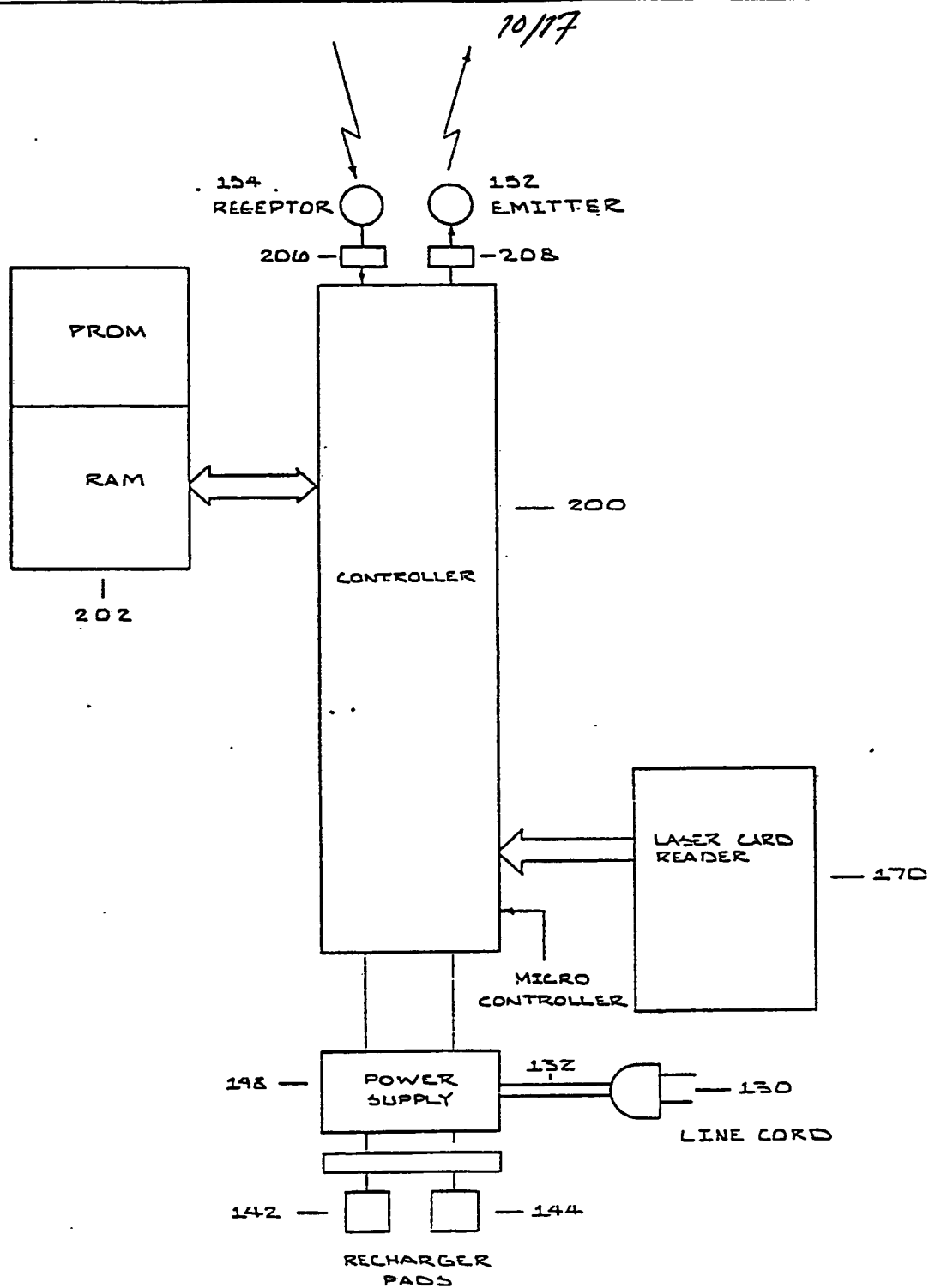


FIG. 9  
BLOCK DIAGRAM OF  
HOLDER 100

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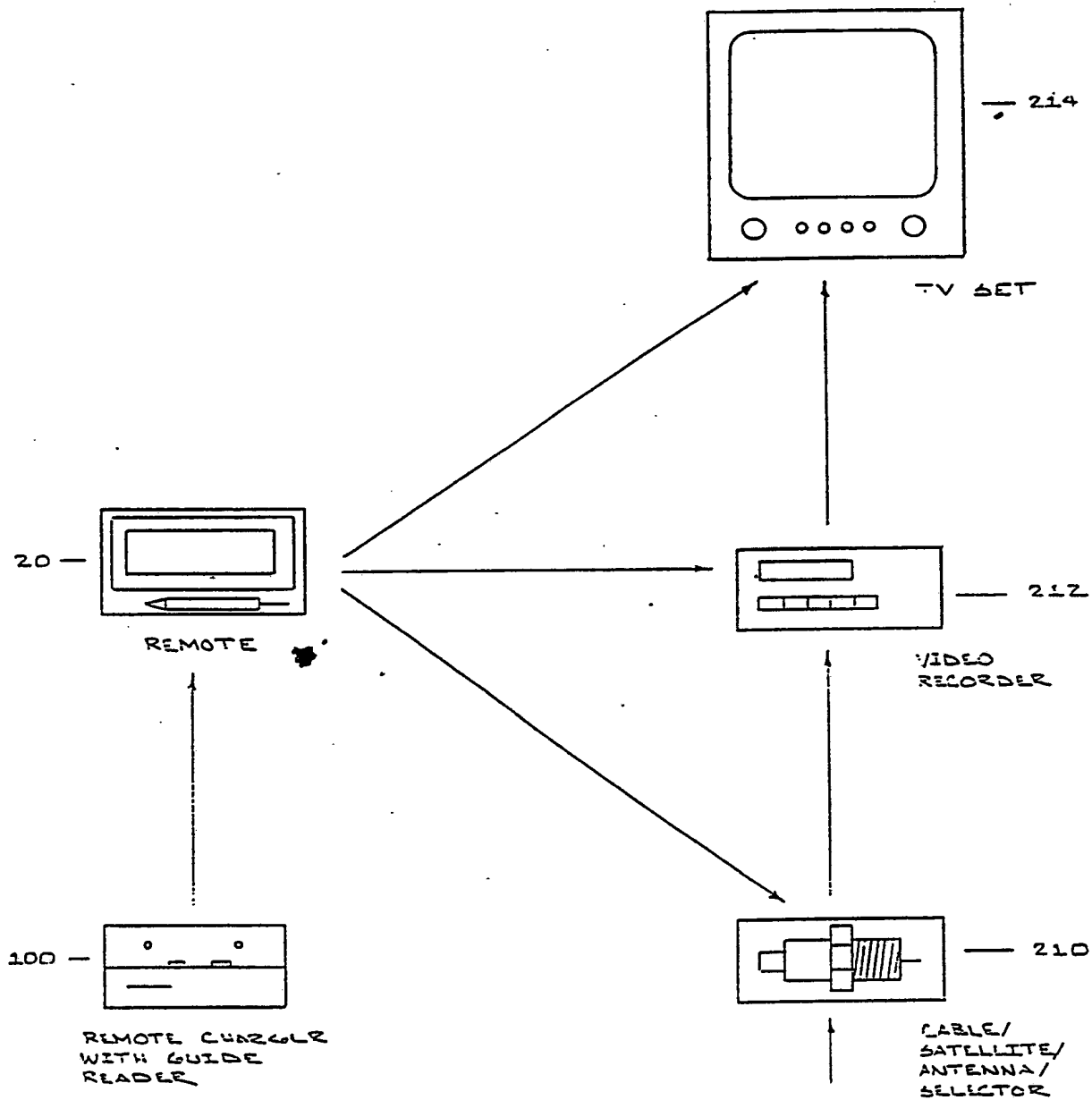


FIG. 10  
TYPICAL  
CONFIGURATI  
OF SYSTEM

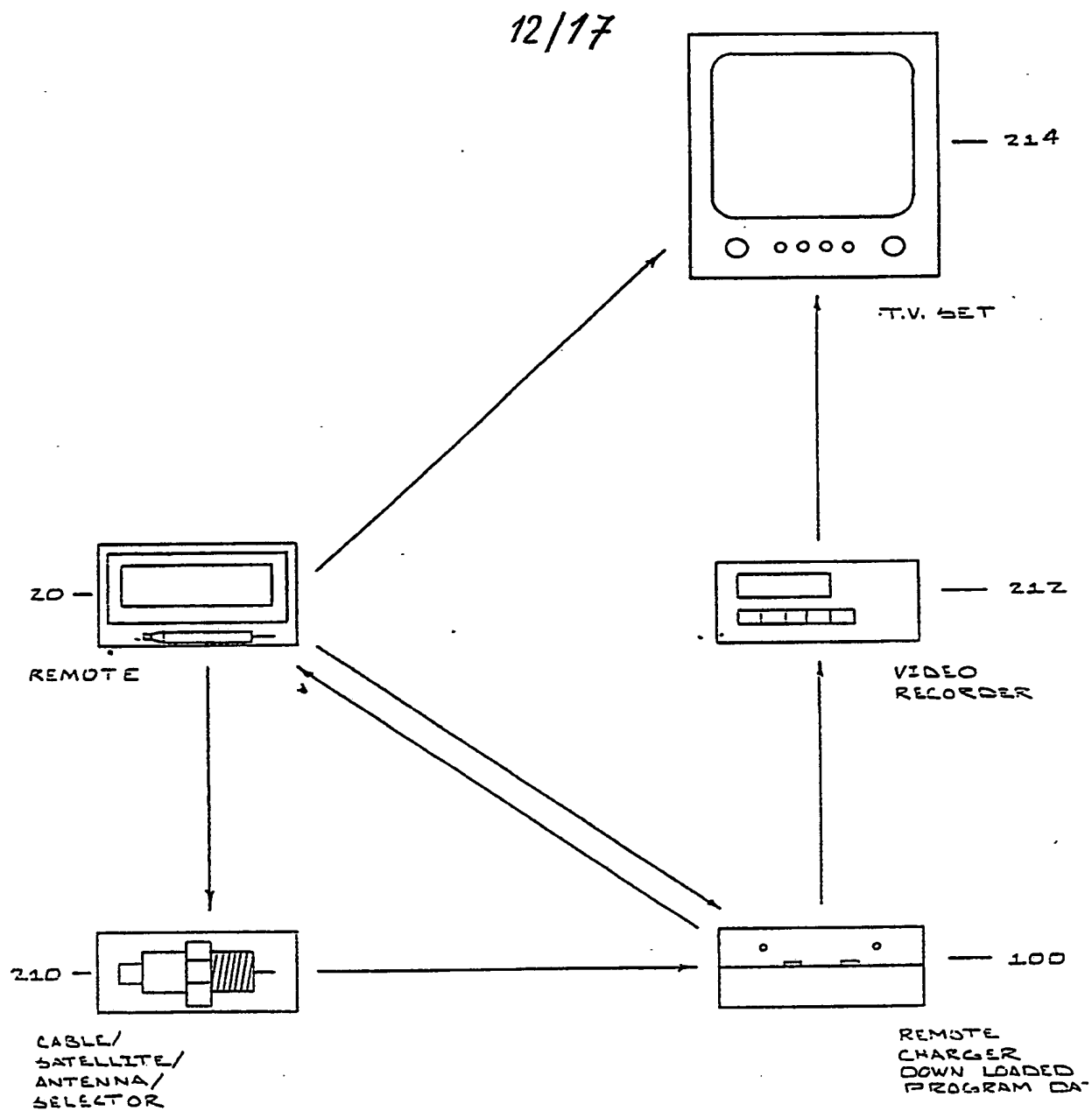


FIG. 11  
ALTERNAT  
CONFIGUR.  
OF SYSTEM

13/17

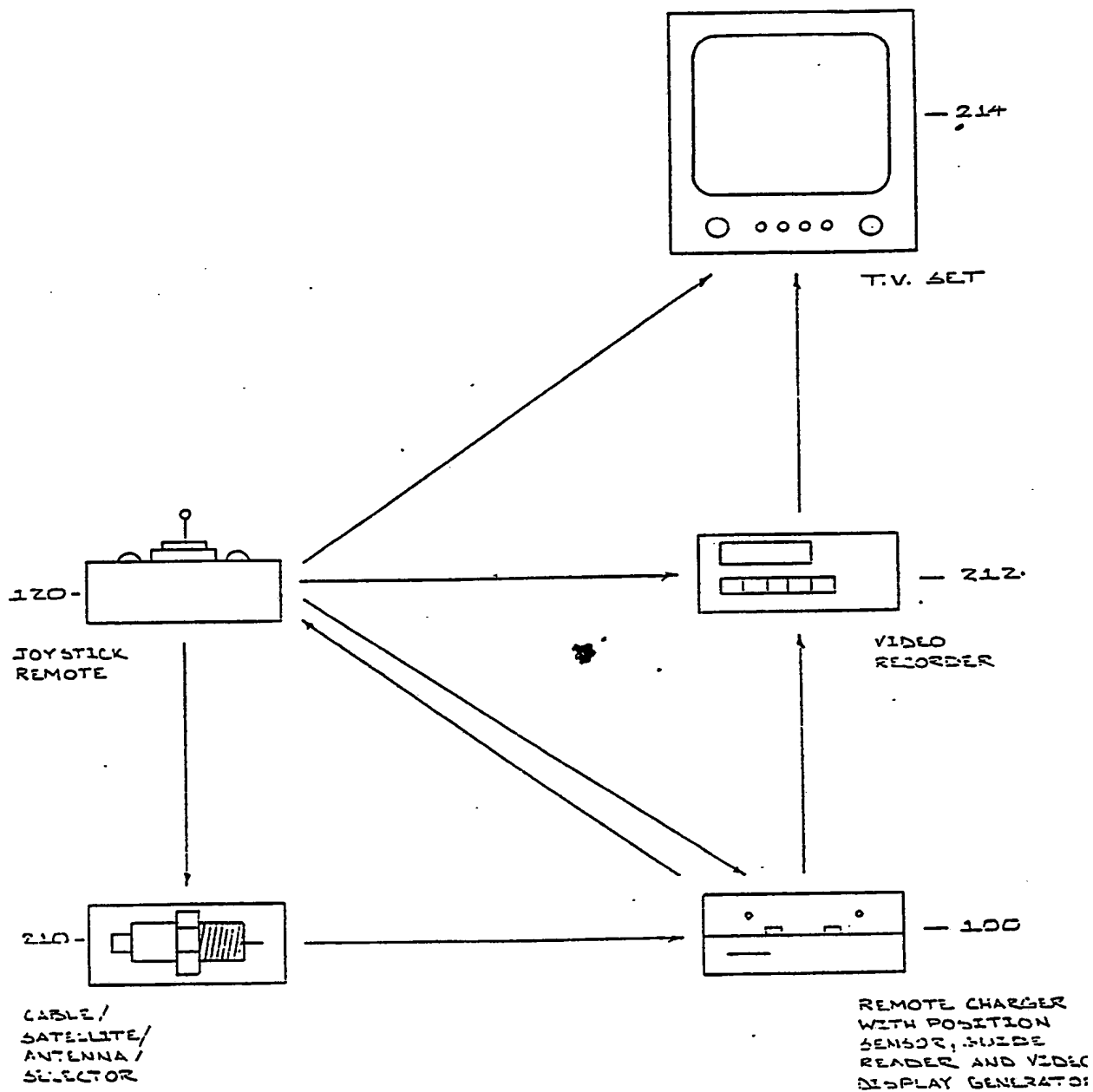


FIG. 12  
ALTERNATIVE  
CONFIGURATION  
OF SYSTEM

14/17

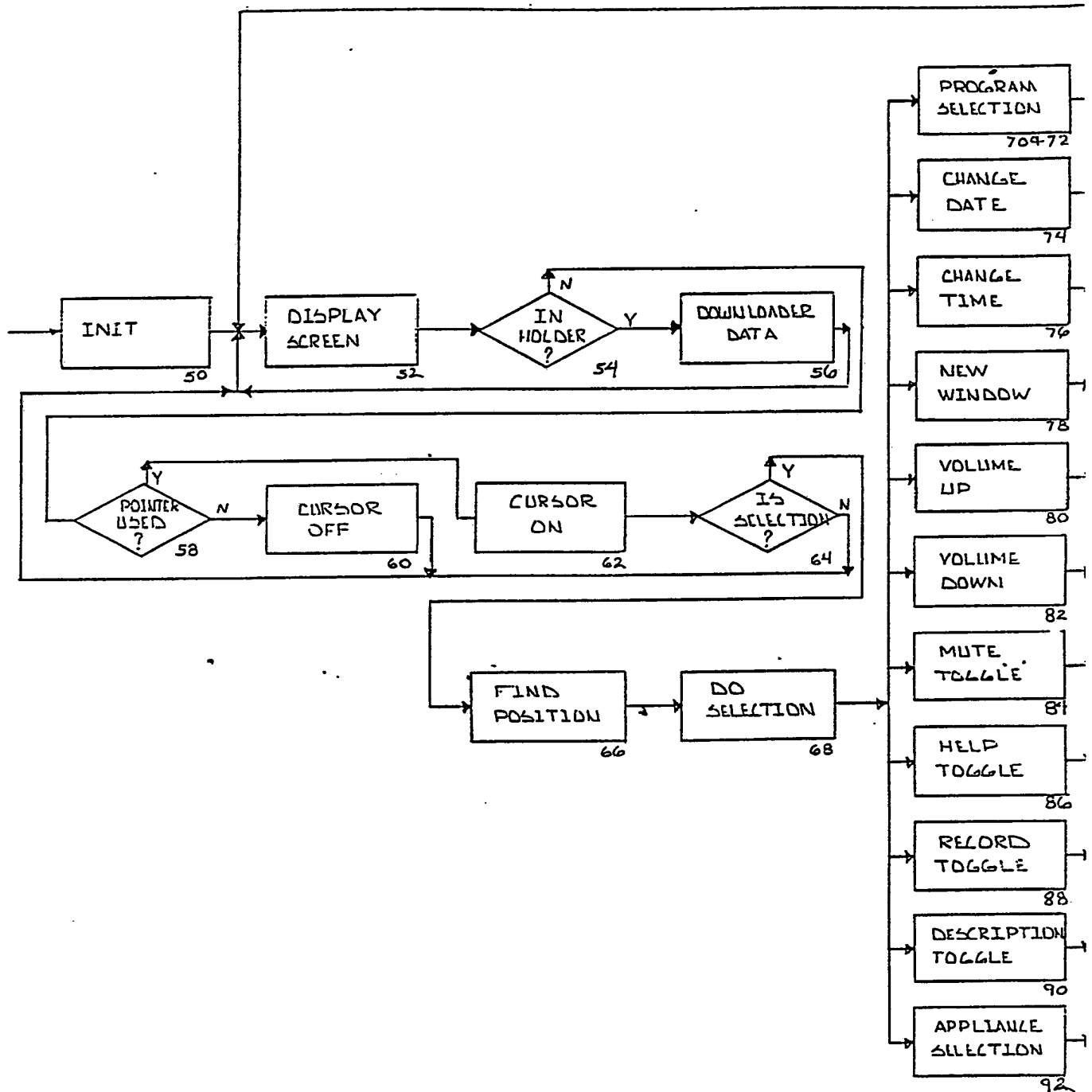


FIG. 13  
FLOW CHART TO CONTROL TABLET



15/17

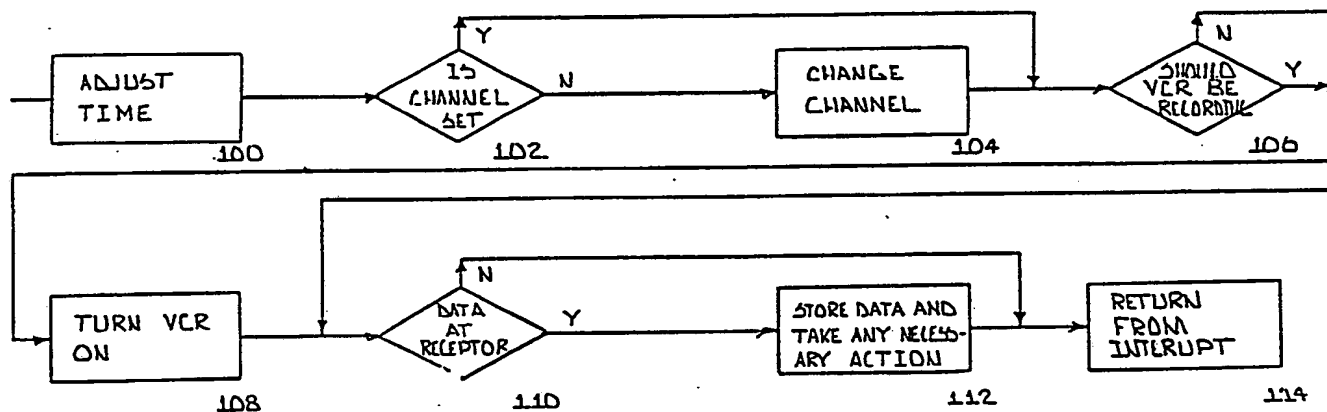


FIG. 14 REAL TIME INTERRUPT PROGRAM

16/77

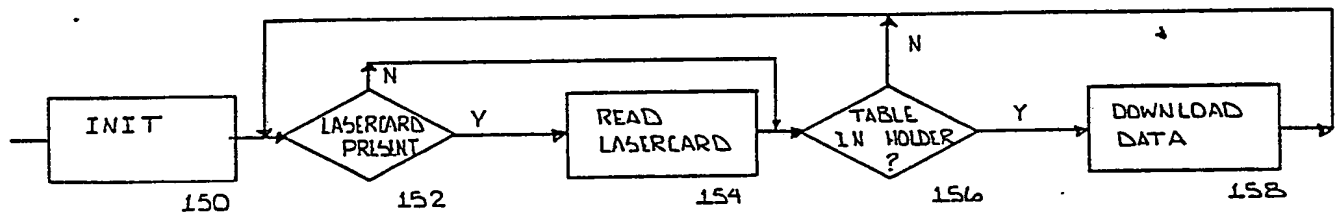


FIG. 15  
FLOW CHART FOR HOLDER PROGRAM

17/17

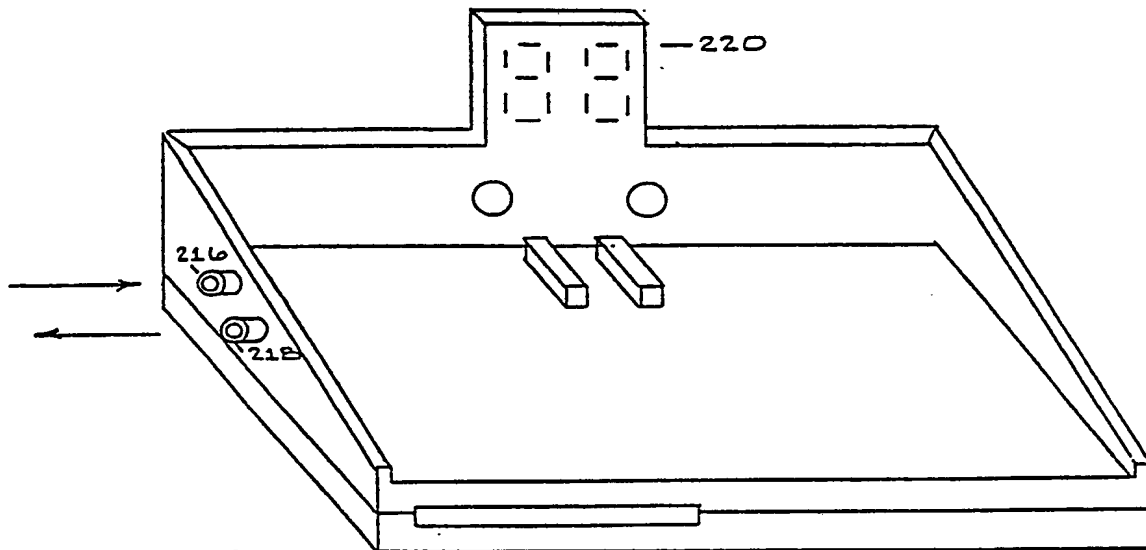


FIG. 16  
HOLDER WITH  
CHANNEL DECC

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/US88/03344

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC(4) G06F 7/04 U.S. Cl. 340/825.06		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
U.S. Cl	358/194.1 340/825.22, 825.06, 825.69, 825.72, 707, 712, 365VL	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>9</sup>		
Category <sup>a</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
Y	US, A 3,956,745 Ellis 11 May 1976 (11.05.76) (Note element 5 can be used with a programmable keyboard 1). See entire document.	1-7
Y	US, A 4,535,333 Twardowski 13 August 1985 (13.08.85) (Twardowski shows that it is known to have a receiver and transmitter in close proximity; i.e. one on top of the other). See entire document.	1-7
Y	US, A 4,626,848 Ehlers 02 December 1986 (02.12.86) (Ehlers shows a display means, transmitting means, and programmable means). See entire document.	1-7
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>a</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
30 November 1988 (30.11.88)		09 JAN 1989
International Searching Authority		Signature of Authorized Officer
ISA/US		 Ulysses Weldon

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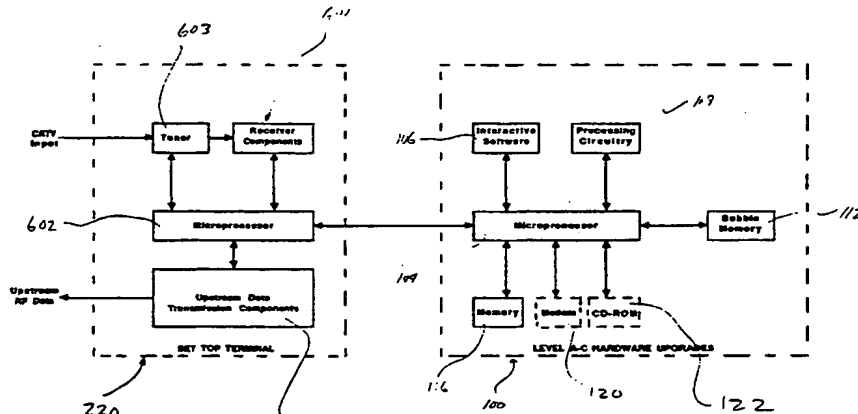
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(54) Title: ADVANCED SET TOP TERMINAL FOR CABLE TELEVISION DELIVERY SYSTEMS



(57) Abstract

A novel advanced set top terminal capable of digital decompression, menu generation, interactivity and other advanced functional capabilities for use in a television program delivery system (200) is described. The invention relates to methods and apparatus for upgrading existing set top terminals (220) to provide menu generation capability and advanced functional capabilities. The invention is particularly useful in television program delivery systems (200) with hundreds of channels of programming, providing (i) menu driven program selection through the addition of an upgrade module (300) or menu generation card and (ii) advanced functional capabilities using a set of hardware upgrades (e.g. 130) and/or an expansion card. Specifically, the invention is an upgradeable system that supports advanced set functionality through the use of internal software, hardware upgrades, an upgrade module and/or expansion cards. The upgraded hardware generally includes a microprocessor, various input/output ports (e.g., 308), processing circuitry (e.g., 108) and memory (e.g., 116). The invention results in an upgraded set top terminal that supports: menu generation; picture-on-picture displays; program catalogue services; interactive services; telephone caller identification; digital audio reception; VCR control; HDTV reception; and backyard satellite system interoperability, among other features and capabilities.

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ADVANCED SET TOP TERMINAL FOR CABLE TELEVISION DELIVERY SYSTEMSRELATED APPLICATIONS

This application is a continuation-in-part of application Serial Number 07/991,074 filed December 9, 1992 entitled TELEVISION PROGRAM PACKAGING AND DELIVERY SYSTEM WITH MENU DRIVEN SUBSCRIBER ACCESS. The following other continuation-in-part applications, also based on the above-referenced patent application, are incorporated herein by reference:

5 Ser. No. \_\_\_\_\_, entitled REPROGRAMMABLE  
10 TERMINAL FOR SUGGESTING PROGRAMS OFFERED ON A  
TELEVISION PROGRAM DELIVERY SYSTEM, filed on  
December \_\_\_\_, 1993;

Ser. No. \_\_\_\_\_, entitled NETWORK CONTROLLER FOR  
CABLE TELEVISION DELIVERY SYSTEMS, filed on December  
15 \_\_\_\_, 1993;

Ser. No. \_\_\_\_\_, entitled AN OPERATIONS CENTER  
FOR A TELEVISION PROGRAM PACKAGING AND DELIVERY  
SYSTEM, filed on December \_\_\_\_, 1993;

Ser. No. \_\_\_\_\_, entitled SET TOP TERMINAL FOR  
20 CABLE TELEVISION DELIVERY SYSTEMS, filed on December  
\_\_\_\_, 1993;

Ser. No. \_\_\_\_\_, entitled DIGITAL CABLE HEADEND  
FOR CABLE TELEVISION DELIVERY SYSTEM, filed on  
December \_\_\_\_, 1993.

25

TECHNICAL FIELD

The invention relates to television entertainment systems for providing television programming to consumer homes. More particularly, the invention relates to a set top terminal for use with a program delivery system with menu selection of programs.

30

**BACKGROUND OF THE INVENTION**

Advances in television entertainment have been primarily driven by breakthroughs in technology. In 1939, advances on Vladimir Zworykin's picture tube provided the stimulus for NBC to begin its first regular broadcasts. In 1975, advances in satellite technology provided consumers with increased programming to homes.

Many of these technology breakthroughs have produced inconvenient systems for consumers. One example is the ubiquitous three remote control home, having a separate and unique remote control for the TV, cable box and VCR. More recently, technology has provided cable users in certain parts of the country with 100 channels of programming. This increased program capacity is beyond the ability of many consumers to use effectively. No method of managing the program choices has been provided to consumers.

Consumers are demanding that future advances in television entertainment, particularly programs and program choices, be presented to the consumer in a user friendly manner. Consumer preferences, instead of technological breakthroughs, will drive the television entertainment market for at least the next 20 years. As computer vendors have experienced a switch from marketing new technology in computer hardware to marketing better useability, interfaces and service, the television entertainment industry will also experience a switch from new technology driving the market to consumer useability driving the market.

Consumers want products incorporating new technology that are useful, and will no longer purchase new technology for the sake of novelty or status. Technological advances in sophisticated hardware are beginning to surpass the capability of the average consumer to use the new



technology. Careful engineering must be done to make entertainment products incorporating new technology useful and desired by consumers.

5 In order for new television entertainment products to be successful, the products must satisfy consumer demands. TV consumers wish to go from limited viewing choices to a variety of choices, from no control of programming to complete control. Consumers wish to advance from cumbersome and inconvenient television to easy and  
10 convenient television and keep costs down. Consumers do not wish to pay for one hundred channels when due to lack of programming information, they seldom, if ever, watch programming on many of these channels.

15 The concepts of interactive television, high definition television and 300 channel cable systems in consumer homes will not sell if they are not packaged, delivered and presented in a useable fashion to consumers. The problem is that TV programming is not being delivered and presented to consumers in a user friendly manner.

20 Consumers are already being bombarded with programming options, numerous "free" cable channels, subscription cable channels and pay-per-view choices. Any further increase in TV entertainment choices, without a user friendly presentation and approach, will likely bewilder  
25 viewers with a mind-numbing array of choices.

The TV industry has traditionally marketed and sold its programs to consumers in bulk, such as continuous feed broadcast and long-term subscriptions to movie channels. The TV industry is unable to sell its programming in large  
30 quantities on a unit per unit basis, such as the ordering of one program. Consumers prefer a unit sales approach because it

keeps costs down and allows the consumer to be more selective in their viewing.

5 In addition, viewership fragmentation, which has already begun, will increase. Programming not presented in a user friendly manner will suffer with a decrease in viewership and revenue. As programming presentation becomes more user friendly, users seek additional features and functional capabilities.

10 What is needed is a system which can deliver and present television programming through a user friendly interface which allows the consumer to easily select from among the many program choices.

15 What is needed is a set top converter that provides a user friendly interface for subscribers to access television programs.

What is needed is a set top converter with enhanced functionality.

What is needed is a set top converter that provides users with advanced features and capabilities.

20 What is needed is a method that allows efficient access to hundreds of television programming options.

What is needed is technology that upgrades the functionality of existing set top converters.

25 What is needed is hardware that provides an upgrade capability allowing the use of existing set top converter technology in advanced program delivery systems.

What is needed is a set top converter that provides an upstream communications capability between the set top converter and cable headend.

30 What is needed is a set top converter that provides a capability of generating menus for display.

What is needed is a set top converter that provides a simple way to select a program from a menu.

What is needed is a set top converter that allows users to subscribe on-screen to specialty channels.

5       What is needed is a set top converter that monitors subscriber viewing choices for statistical purposes.

What is needed is a set top converter that provides sophisticated on-screen television menus which can incorporate still video and moving video.

10       What is needed is a set top converter that provides a capability of scaling and redirecting video for menus. The present invention is addressed to fulfill these needs.

#### SUMMARY OF INVENTION

15       The present invention is a set top converter box or terminal for a television program delivery system. More specifically, the present invention is an advanced set top converter box that acts as a terminal in the viewer home. The set top terminal is a key component of a digital cable television delivery system. The set top terminal is an  
20       upgradeable system that provides for the decompression of digital program signals. The preferred set top terminal provides both a menu generation capability as well as a number of advanced features and functional capabilities.

25       The set top terminal of the present invention may be achieved through a set of hardware upgrades to any of the following embodiments: (1) an existing set top converter upgraded with a circuit card (which has a microprocessor electronically connected to the set top converter); (2) an industry standard decompression converter upgradeable by  
30       either an upgrade module or a menu generation card; and (3) a set top converter box capable of both decompression and menu generation. The hardware upgrades provide additional

advanced features and functional capabilities to any of these embodiments.

A number of advanced features and functional capabilities are supported by the preferred set top terminal.

5 This set top terminal provides subscribers with a picture-on-picture capability without requiring a special television to support the capability. The set top terminal also supports a TV guide service, which provides subscribers with information on all programming available at its particular subscriber location. The set top terminal further includes the capability of querying viewers to establish, among other things, favorite channel lists, personal profile data and mood information. The set top terminal allows the subscriber to view promotional menus on future programming events.

15 The set top terminal supports additional capabilities using its hardware upgrades that allow subscribers to use other interactive services, for example, to engage in on-line question and answer sessions, to order and confirm airline tickets, and to access a variety of other data services. The set top terminal makes use of a digital tuner as a hardware upgrade to provide subscribers with a digital audio capability.

25 The preferred set top terminal may be used to control video tape machines, thereby simplifying the recording of programs. The set top terminal can, in conjunction with the program delivery system, easily support high definition television (HDTV). For subscribers living in remote locations, the set top terminal accommodates backyard satellite systems. In addition to all the features that the set top terminal supports with its current internal programming and upgradeability, additional features may be added or existing features increased through remote reprogramming of the set top terminal 220.

It is an object of the invention to provide a user friendly interface for subscribers to access television programs.

It is an object of the invention to allow users to easily navigate through hundreds of programming choices using on-screen menus.

It is an object of this invention to efficiently access hundreds of television programming options.

It is an object of this invention to upgrade the functionality of existing set top converters.

It is an object of this invention to provide an upgrade capability allowing the use of existing set top converter technology in an advanced program delivery system.

It is an object of this invention to provide an upstream communications capability between the set top converter and cable headend.

It is an object of this invention to provide a set top terminal capable of generating menus for display.

It is an object of this invention to allow users to subscribe on-screen to specialty channels.

It is an object of this invention to monitor subscriber viewing choices for statistical purposes.

It is an object of this invention to provide sophisticated on-screen television menus which can incorporate still video and moving video.

These and other objects and advantages of the invention will become obvious to those skilled in the art upon review of the following description, the attached drawings and appended claims.

#### **DESCRIPTION OF THE DRAWINGS**

Figure 1 is a diagram of the primary components of the television delivery system.

Figure 2 is an overview of the television delivery system operations.

Figure 3 is a schematic of the operation of the primary components of the system.

5        Figure 4 is a block diagram of the hardware components of the set top terminal.

Figure 5a is a perspective front view of a set top terminal.

10       Figure 5b is a perspective rear view of a set top terminal.

Figure 6 is a schematic of a Turbo card upgrade for a set top terminal.

Figure 7a is a drawing of a frame format for program control information signal.

15       Figure 7b is a drawing of a frame format for a polling response from the set top terminal.

Figure 8 is a drawing of the basic menus used in the present invention, including the ten major menus represented by icons.

20       Figure 9a is a schematic of a basic decompression box with upgrade module and associated connections.

Figure 9b is a schematic of an alternative embodiment of a simple decompression box with upgrade module and associated connections.

25       Figure 10 is a more detailed block diagram of the components of a simple decompression box with upgrade module.

Figure 11 is a schematic of the set top terminal's upstream data transmission hardware.

30       Figure 12a is a schematic showing the components of the Level A, B, and C hardware upgrades.

Figure 12b is a schematic showing the components of the Level D hardware upgrade.

Figure 13a is a schematic showing the two parts of a remote control unit.

5        Figure 13b is a drawing of the preferred remote control unit.

Figure 14 is a diagram of the components of a set top terminal having a picture-on-picture capability.

10       Figure 15 is a drawing of a menu related to program catalogue services.

Figures 16a through 16d are drawings of viewer querying and mood question menus.

15       Figures 17a and 17b are drawings of the set top terminal hardware components that accommodate transparent channel switching.

Figure 18 is a drawing of an interactive television promotional menu for a set top terminal hardware upgrade.

20       Figures 19a and 19b are drawings of submenus for interactive television services using hardware upgrade Level A.

Figures 20a through 20d are drawings of interactive services using hardware upgrade Level B, which are related to on-screen airline reservations.

25       Figure 21 is a drawing of a menu for digital audio services.

Figure 22 is a drawing of a menu related to program guide services.

30       Figure 23 is a drawing of a menu related to high definition television (HDTV) programming.

## **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

## **A Television Program Delivery System Description**

## 1. Introduction

5           Figure 1 shows the present invention as part of an expanded cable television program delivery system 200 that dramatically increases programming capacity using compressed transmission of television program signals. Developments in digital bandwidth compression technology  
10 now allow much greater throughput of television program signals over existing or slightly modified transmission media. The program delivery system 200 shown provides subscribers with a user friendly interface to operate and exploit a six-fold or more increase in current program delivery capability.

15           Subscribers are able to access an expanded television  
program package and view selected programs through a  
menu-driven access scheme that allows each subscriber to  
select individual programs by sequencing a series of menus.  
The menus are sequenced by the subscriber using simple  
20   alpha-numeric and iconic character access or moving a cursor  
or highlight bar on the TV screen to access desired programs  
by simply pressing a single button, rather than recalling from  
memory and pressing the actual two or more digit numeric  
number assigned to a selection. Thus, with the press of a  
25   single button, the subscriber can advance from one menu to  
the next. In this fashion, the subscriber can sequence the  
menus and select a program from any given menu. The  
programs are grouped by category so that similar program  
offerings are found on the same menu.

## 30                      2.    Major System Components

In its most basic form, the system uses a program delivery system 200 in conjunction with a conventional



concatenated cable television system 210. The program delivery system 200 generally includes (i) at least one operations center 202, where program packaging and control information are created and then assembled in the form of digital data, (ii) a digital compression system, where the digital data is compressed, combined/multiplexed, encoded, and mapped into digital signals for satellite transmission to the cable headend 208, and (iii) a set of in-home decompressors. The program delivery system 200 transports the digital signals to the cable headend 208 where the signals are transmitted through a concatenated cable television system 210. Within the cable headend 208, the received signals may be decoded, demultiplexed, managed by a local central distribution and switching mechanism, combined and then transmitted to the set top terminal 220 located in each subscriber's home over the cable system 210. Although concatenated cable systems 210 are the most prevalent transmission media to the home, telephone lines, cellular networks, fiberoptics, Personal Communication Networks and similar technology for transmitting to the home can be used interchangeably with this program delivery system 200.

The delivery system 200 has a reception region 207 with an in-home decompression capability. This capability is performed by a decompressor housed within a set top terminal 220 in each subscriber's home. The decompressor remains transparent from the subscriber's point of view and allows any of the compressed signals to be demultiplexed and individually extracted from the composite data stream and then individually decompressed upon selection by the subscriber. The decompressed video signals are converted into analog signals for television display. Such analog signals include NTSC formatted signals for use by a standard

television. Control signals are likewise extracted and decompressed and then either executed immediately or placed in local storage such as a RAM. Multiple sets of decompression hardware may be used to decompress video and control signals. The set top terminal 220 may then overlay or combine different signals to form the desired display on the subscriber's television. Graphics on video or picture-on-picture are examples of such a display.

Although a single digital compression standard (e.g., MPEG) may be used for both the program delivery system 200 and the concatenated cable system 210, the compression technique used may differ between the two systems. When the compression standards differ between the two media, the signals received by the cable headend 208 must be decompressed before transmission from the headend 208 to the set top terminals 220. Subsequently, the cable headend 208 must recompress and transmit the signals to the set top terminal 220, which would then decompress the signals using a specific decompression algorithm.

The video signals and program control signals received by the set top terminal 220 correspond to specific television programs and menu selections that each subscriber may access through a subscriber interface. The subscriber interface is a device with buttons located on the set top terminal 220 or on a portable remote control 900. In the preferred system embodiment, the subscriber interface is a combined alpha-character, numeric and iconic remote control device 900, which provides direct or menu-driven program access. The preferred subscriber interface also contains cursor movement and go buttons as well as alpha, numeric and iconic buttons. This subscriber interface and menu arrangement enables the subscriber to sequence

through menus by choosing from among several menu options that are displayed on the television screen. In addition, a user may bypass several menu screens and immediately choose a program by selecting the appropriate alpha-character, numeric or iconic combinations on the subscriber interface. In the preferred embodiment, the set top terminal 220 generates the menus that are displayed on the television by creating arrays of particular menu templates, and the set top terminal 220 displays a specific menu or submenu option for each available video signal.

### 3. Operations Center and Digital Compression System

The operations center 202 performs two primary services, packaging television programs and generating the program control information signal. At the operations center 202, television programs are received from external program sources in both analog and digital form. Figure 2 shows an embodiment of the operations center receiving signals from various external sources 212. Examples of the external program sources are sporting events, children's programs, specialty channels, news or any other program source that can provide audio or visual signals. Once the programs are received from the external program sources, the operations center 202 digitizes (and preferably compresses) any program signals received in analog form. The operations center 202 may also maintain an internal storage of programs. The internally stored programs may be in analog or digital form and stored on permanent or volatile memory sources, including magnetic tape or RAM. Subsequent to receiving programming, the operations center 202 packages the programs into the groups and categories which provide the optimal marketing of the programs to subscribers. For

example, the operations center 202 may package the same programs into different categories and menus for weekday, prime-time viewing and Saturday afternoon viewing. Also, the operations center 202 packages the television programs in a manner that enables both the various menus to easily represent the programs and the subscribers to easily access the programs through the menus.

The packaging of the digital signals is typically performed at the operations center 202 by computer assisted packaging equipment (CAP). The CAP system normally includes at least one computer monitor, keyboard, mouse, and standard video editing equipment. A programmer packages the signals by entering certain information into the CAP. This information includes the date, time slot, and program category of the various programs. The programmer and the CAP utilize demographic data and ratings in performing the packaging tasks. After the programmer selects the various programs from a pool of available programs and inputs the requisite information, the programmer, with assistance from the CAP, can select the price and allocate transponder space for the various programs. After the process is complete, the CAP displays draft menus or program schedules that correspond to the entries of the programmer. The CAP may also graphically display allocation of transponder space. The programmer may edit the menus and transponder allocation several times until satisfied with the programming schedule. During the editing, the programmer may direct the exact location of any program name on a menu with simple commands to the CAP.

The packaging process also accounts for any groupings by satellite transponder which are necessary. The operations center 202 may send different groups of programs to

different cable headends 208 and/or set top terminals 220. One way the operations center 202 may accomplish this task is to send different program packages to each transponder. Each transponder, or set of transponders, then relays a  
5 specific program package to specific cable headends 208 and/or set top terminals 220. The allocation of transponder space is an important task performed by the operations center 202.

The operations center 202 may also "insert" directions  
10 for filling local available program time in the packaged signal to enable local cable and television companies to fill the program time with local advertising and/or local programming. Consequently, the local cable headends 208 are not constrained to show only programs transmitted from  
15 the operations center 202. New set top converters will incorporate both digital and analog channels. Therefore, the cable headend 208 may combine analog signals with the digital signals prior to transmitting the program signals to the set top terminals 220.

After the CAP packages the programs, it creates a  
20 program control information signal to be delivered with the program package to the cable headend 208 and/or set top terminal 220. The program control information signal contains a description of the contents of the program  
25 package, commands to be sent to the cable headend 208 and/or set top terminal 220, and other information relevant to the signal transmission.

In addition to packaging the signal, the operations  
center 202 employs digital compression techniques to  
30 increase existing satellite transponder capacity by at least a 4:1 ratio, resulting in a four-fold increase in program delivery capability. A number of digital compression algorithms

currently exist which can achieve the resultant increase in capacity and improved signal quality desired for the system. The algorithms generally use one or more of three basic digital compression techniques: (1) within-frame (intraframe) compression, (2) frame-to-frame (interframe) compression, and (3) within carrier compression. Specifically, in the preferred embodiment, the MPEG 2 compression method is used. After digital compression, the signals are combined (multiplexed) and encoded. The combined signal is subsequently transmitted to various uplink sites 204.

There may be a single uplink site 204 or multiple uplink sites (represented by 204', shown in phantom in Figure 1) for each operation center 202. The uplink sites 204 may either be located in the same geographical place or may be located remotely from the operations center 202. Once the composite signal is transmitted to the uplink sites 204, the signal may be multiplexed with other signals, modulated, upconverted and amplified for transmission over satellite. Multiple cable headends 208 may receive such transmissions.

In addition to multiple uplinks, the delivery system 200 may also contain multiple operations centers. The preferred method for using multiple operations centers is to designate one of the operations centers as a master operations center and to designate the remaining operations centers as slave operations centers. In this configuration, the master operations center coordinates various functions among the slave operations centers such as synchronization of simultaneous transmissions and distributes the operations workload efficiently.

#### 4. Cable Headend

After the operations center 202 has compressed and encoded the program signals and transmitted the signals to the satellite, the cable headend 208 receives and further processes the signals before they are relayed to each set top terminal 220. Each cable headend site is generally equipped with multiple satellite receiver dishes. Each dish is capable of handling multiple transponder signals from a single satellite and sometimes from multiple satellites.

As an intermediary between the set top terminals 220 and the operations center 202 (or other remote site), the cable headend 208 performs two primary functions. First, the cable headend 208 acts as a distribution center, or signal processor, by relaying the program signal to the set top terminal 220 in each subscriber's home. In addition, the cable headend 208 acts as a network controller 214 by receiving information from each set top terminal 220 and passing such information on to an information gathering site such as the operations center 202.

Figure 3 shows an embodiment where the cable headend 208 and the subscriber's home are linked by certain communications media 216. In this particular embodiment, analog signals, digitally compressed signals, other digital signals and up-stream/interactivity signals are sent and received over the media 216. The cable headend 208 provides such signaling capabilities in its dual roles as a signal processor 209 and network controller 214.

As a signal processor 209, the cable headend 208 prepares the program signals that are received by the cable headend 208 for transmission to each set top terminal 220. In the preferred system, the signal processor 209 re-routes or demultiplexes and recombines the signals and digital information received from the operations center 202 and

allocates different portions of the signal to different frequency ranges. Cable headends 208 which offer different subscribers different program offerings may allocate the program signals from the operations center 202 in various  
5 manners to accommodate different viewers. The signal processor 209 may also incorporate local programming and/or local advertisements into the program signal and forward the revised signal to the set top terminals 220. To accommodate this local programming availability, the signal  
10 processor 209 must combine the local signal in digital or analog form with the operations center program signals. If the local cable system uses a compression standard that is different than the one used by the operations center 202, the signal processor 209 must also decompress and recompress  
15 incoming signals so they may be properly formatted for transmission to the set top terminals 220. This process becomes less important as standards develop (i.e., MPEG 2). In addition, the signal processor 209 performs any necessary signal decryption and/or encryption.

20 As a network controller 214, the cable headend 208 performs the system control functions for the system. The primary function of the network controller 214 is to manage the configuration of the set top terminals 220 and process signals received from the set top terminals 220. In the  
25 preferred embodiment, the network controller 214 monitors, among other things, automatic poll-back responses from the set top terminals 220 remotely located at each subscribers' home. The polling and automatic report-back cycle occurs frequently enough to allow the network  
30 controller 214 to maintain accurate account and billing information as well as monitor authorized channel access. In the simplest embodiment, information to be sent to the



network controller 214 will be stored in RAM within each subscriber's set top terminal 220 and will be retrieved only upon polling by the network controller 214. Retrieval may, for example, occur on a daily, weekly or monthly basis. The  
5 network controller 214 allows the system to maintain complete information on all programs watched using a particular set top terminal 220.

The network controller 214 is also able to respond to the immediate needs of a set top terminal 220 by modifying a  
10 program control information signal received from the operations center 202. Therefore, the network controller 214 enables the delivery system to adapt to the specific requirements of individual set top terminals 220 when the requirements cannot be provided to the operations center  
15 202 in advance. In other words, the network controller 214 is able to perform "on the fly programming" changes. With this capability, the network controller 214 can handle sophisticated local programming needs such as, for example, interactive television services, split screen video, and  
20 selection of different foreign languages for the same video. In addition, the network controller 214 controls and monitors all compressors and decompressors in the system.

The delivery system 200 and digital compression of the preferred embodiment provides a one-way path from the  
25 operations center 202 to the cable headend 208. Status and billing information is sent from the set top terminal 220 to the network controller 214 at the cable headend 208 and not directly to the operations center 202. Thus, program monitoring and selection control will take place only at the  
30 cable headend 208 by the local cable company and its decentralized network controllers 214 (i.e., decentralized relative to the operations center 202, which is central to the

program delivery system 200). The local cable company will in turn be in communication with the operations center 202 or a regional control center (not shown) which accumulates return data from the set top terminal 220 for statistical or billing purposes. In alternative system embodiments, the operations center 202 and the statistical and billing sites are collocated. Further, telephone lines with modems are used to transfer information from the set top terminal 220 to the statistical and billing sites.

## 5. Set Top Terminal

The set top terminal 220 is the portion of the delivery system 200 that resides in the home of a subscriber. The set top terminal 220 is usually located above or below the subscriber's television, but it may be placed anywhere in or near the subscriber's home as long as it is within the range of the subscriber's remote control device 900. In some aspects, the set top terminal 220 may resemble converter boxes already used by many cable systems. For instance, each set top terminal 220 may include a variety of error detection, decryption, and coding techniques such as anti-taping encoding. However, it will become apparent from the discussion below that the set top terminal 220 is able to perform many functions that an ordinary converter box cannot perform.

The set top terminal 220 has a plurality of input and output ports to enable it to communicate with other local and remote devices. The set top terminal 220 has an input port that receives information from the cable headend 208. In addition, the unit has at least two output ports which provide communications from the set top terminal 220 to a television and a VCR. Certain menu selections may cause the set top terminal 220 to send control signals directly to the VCR to

automatically program or operate the VCR. Also, the set top terminal 220 contains a phone jack which can be used for maintenance, trouble shooting, reprogramming and additional customer features. The set top terminal 220 may  
5 also contain stereo/audio output terminals and a satellite dish input port.

Functionally, the set top terminal 220 is the last component in the delivery system chain. The set top terminal 220 receives compressed program and control  
10 signals from the cable headend 208 (or, in some cases, directly from the operations center 202). After the set top terminal 220 receives the individually compressed program and control signals, the signals are demultiplexed, decompressed, converted to analog signals (if necessary) and  
15 either placed in local storage (from which the menu template may be created), executed immediately, or sent directly to the television screen.

After processing certain signals received from the cable headend 208, the set top terminal 220 is able to store menu  
20 templates for creating menus that are displayed on a subscriber's television by using an array of menu templates. Before a menu can be constructed, menu templates must be created and sent to the set top terminal 220 for storage. A microprocessor uses the control signals received from the  
25 operations center 202 or cable headend 208 to generate the menu templates for storage. Each menu template may be stored in volatile memory in the set top terminal 220. When the set top terminal receives template information it demultiplexes the program control signals received from the  
30 cable headend 208 into four primary parts: video, graphics, program logic and text. Each menu template represents a different portion of a whole menu, such as a menu

background, television logo, cursor highlight overlay, or other miscellaneous components needed to build a menu. The menu templates may be deleted or altered using control signals received from the operations center 202 or cable headend 208.

Once the menu templates have been stored in memory, the set top terminal 220 can generate the appropriate menus. In the preferred embodiment, the basic menu format information is stored in memory located within the set top terminal 220 so that the microprocessor may locally access the information from the set top terminal instead of from an incoming signal. The microprocessor next generates the appropriate menus from the menu templates and the other menu information stored in memory. The set top terminal 220 then displays specific menus on the subscriber's television screen that correspond to the inputs the subscriber selects.

If the subscriber selects a specific program from a menu, the set top terminal 220 determines on which channel the program is being shown, demultiplexes and extracts the single channel transmitted from the cable headend 208. The set top terminal 220 then decompresses the channel and, if necessary, converts the program signal to an analog NTSC signal to enable the subscriber to view the selected program. The set top terminal 220 can be equipped to decompress more than one program signal, but this would unnecessarily add to the cost of the unit since a subscriber will generally only view one program at a time. However, two or three decompressors may be desirable to provide picture-on-picture capability, control signal decompression, enhanced channel switching or like features.

In addition to menu information, the set top terminal 220 may also store text transmitted from the cable headend 208 or the operations center 202. The text may inform the subscriber about upcoming events, billing and account status, new subscriptions, or other relevant information. The text will be stored in an appropriate memory location depending on the frequency and the duration of the use of the textual message.

Also, optional upgrades are available to enhance the performance of a subscriber's set top terminal 220. These upgrades may consist of a cartridge or computer card (not shown) that is inserted into an expansion slot in the set top terminal 220 or may consist of a feature offered by the cable headend 208 or operations center 202 to which the user may subscribe. Available upgrades may include on line data base services, interactive multi-media services, access to digital radio channels, and other services.

In the simplest embodiment, available converter boxes such as those manufactured by General Instruments or Scientific Atlanta, may be modified and upgraded to perform the functions of a set top terminal 220. The preferred upgrade is a circuit card with a microprocessor which is electronically connected to or inserted into the converter box.

## 6. Remote Control Device

The primary conduit for communication between the subscriber and the set top terminal 220 is through the subscriber interface, preferably a remote control device 900. Through this interface, the subscriber may select desired programming through the system's menu-driven scheme or by directly accessing a specific channel by entering the actual channel number. Using the interface, the subscriber can

navigate through a series of informative program selection menus. By using menu-driven, iconic or alpha-character access, the subscriber can access desired programs by simply pressing a single button rather than recalling from memory and pressing the actual channel number to make a selection. The subscriber can access regular broadcast and basic cable television stations by using either the numeric keys on the remote control 900 (pressing the corresponding channel number), or one of the menu icon selection options.

In addition to enabling the subscriber to easily interact with the cable system 200, the physical characteristics of the subscriber interface 900 should also add to the user friendliness of the system. The remote control 900 should easily fit in the palm of the user's hand. The buttons of the preferred remote control 900 contain pictorial symbols that are easily identifiable by the subscriber. Also, buttons that perform similar functions may be color coordinated and consist of distinguishing textures to increase the user friendliness of the system.

#### 7. Menu-Driven Program Selection

The menu-driven scheme provides the subscriber with one-step access to all major menus, ranging from hit movies to sport specials to specialty programs. From any of the major menus, the subscriber can in turn access submenus and minor menus by cursor or alpha-character access.

There are two different types of menus utilized by the preferred embodiment, the Program Selection menus and the During Program menus. The first series of menus, Program Selection menus, consists of an Introductory, a Home, Major menus, and Submenus. The second series of menus, During Program menus, consists of two primary types, Hidden menus and the Program Overlay menus.

Immediately after the subscriber turns on the set top terminal 220, the Introductory menu welcomes the subscriber to the system. The Introductory menu may display important announcements from the local cable franchise, advertisements from the cable provider, or other types of messages. In addition, the Introductory menu can inform the subscriber if the cable headend 208 has sent a personal message to the subscriber's particular set top terminal 220.

After the Introductory menu has been displayed the subscriber may advance to the next level of menus, namely the Home menu. In the preferred embodiment, after a certain period of time, the cable system will advance the subscriber by default to the Home menu. From the Home menu, the subscriber is able to access all of the programming options. The subscriber may either select a program directly by entering the appropriate channel number from the remote control 900, or the subscriber may sequence through incremental levels of menu options starting from the Home menu. The Home menu lists categories that correspond to the first level of menus called Major menus.

If the subscriber chooses to sequence through subsequent menus, the subscriber will be forwarded to the Major menu that corresponds to the chosen category from the Home menu. The Major menus further refine a subscriber's search and help guide the subscriber to the selection of his choice.

From the Major menus, the subscriber may access several submenus. From each submenu, the subscriber may access other submenus until the subscriber finds a desired television program. Similar to the Major menu, each successive level of Submenus further refines the subscriber's search. The system also enables the subscriber to skip

certain menus or submenus and directly access a specific menu or television program by entering the appropriate commands on the remote control 900.

5       The During program menus (including Hidden Menus and Program Overlay Menus) are displayed by the set top terminal 220 only after the subscriber has selected a television program. In order to avoid disturbing the subscriber, the set top terminal 220 does not display the Hidden Menus until the subscriber selects the appropriate  
10       option to display a Hidden Menu. The Hidden Menus contain options that are relevant to the program selected by the viewer. For example, a Hidden Menu may contain options that enable a subscriber to enter an interactive mode or escape from the selected program.

15       Program Overlay Menus are similar to Hidden Menus because they occur during a program and are related to the program being viewed. However, the Program Overlay Menus are displayed concurrently with the program selected by the subscriber. Most Program Overlay Menus are small enough on  
20       the screen to allow the subscriber to continue viewing the selected program comfortably.

B.   Detailed Set Top Terminal Description

25       The set top terminal 220 receives and manipulates signals from the cable headend 208. The set top terminal 220 is equipped with local computer memory and the capability of interpreting the digitally compressed signal to produce menus for the subscriber. The remote control 900 communicates the subscriber's selections to the set top terminal 220. The subscriber's selections are generally based  
30       upon menus or other prompts displayed on the television screen.



It is preferred that the signal reaches the subscriber's home in a compressed format and is decompressed prior to viewing. Included in the delivered program signal is information that enables equipment at the subscriber's home to display menus for choosing particular programs. Depending on the particular embodiment, the television program signal may arrive at the subscriber's home through one or more connections such as coaxial cables, fiber cables, twisted pairs, cellular telephone connections, or personal communications network (PCN) hookups.

The program control information signal is generated by the operations center 202 and provides the network controller 214 with data on the scheduling and description of programs. In an alternate configuration, this data is sent directly to the set top terminal 220 for display to the subscriber. In the preferred embodiment, the program control information signal is stored and modified by the network controller 214 and sent to the set top terminal 220 in the form of a set top terminal control information stream (STTCIS). The set top terminal 220 integrates either the program control information signal or the STTCIS with data stored in the memory of the set top terminal 220 to generate on-screen menus that assist the subscriber in choosing programs for display.

The types of information that can be sent using the program control signal include: number of program categories, names of program categories, what channels are assigned to a specific category (such as specialty channels), names of channels, names of programs on each channel, program start times, length of programs, description of programs, menu assignment for each program, pricing, whether there is a sample video clip for advertisement for

the program, and any other program, menu or product information.

5       With a minimal amount of information being communicated to the set top terminal 220 on a regular basis, the set top terminal 220 is able to determine the proper menu location for each program and the proper time and channel to activate for the subscriber after a menu selection. The program control information signal and STTCIS can be formatted in a variety of ways and the on-screen menus can be produced using many different methods. For instance, if  
10       the program control information signal carries no menu format information, the menu format for creating the menus can be fixed in ROM at the set top terminal 220. In the preferred embodiment, the menu format information is stored at the set top terminal 220 in a temporary memory device such as a RAM or EPROM. New menu format information is sent via the program control information signal or the STTCIS to the set top terminals 200 whenever a  
15       change to a menu format is desired.

20       In the simplest embodiment, the menu formats remain fixed and only the text changes. In this way the program control information signal can be limited to primarily text and a text generator can be employed in the set top terminal 220. Another simple embodiment uses a separate channel  
25       full-time (large bandwidth) just for the menu information.

      Live video signals may be used in windows of certain menus. These video signals can be transmitted using the program control information signal or STTCIS, or can be taken off channels being transmitted simultaneously with the  
30       menu display. Video for menus, promos or demos may be sent to the set top terminal 220 in several formats, including (1) on a dedicated channel, (2) on a regular program channel

and scaled to size, or (3) along with the program control information signal. However, in the preferred embodiment, a large number of short promos or demo video is sent using a split screen technique on a dedicated channel. A multiple  
5 window technique may be used with the menus to display a description of a program and one or more video frames that assist the subscriber in selecting the program.

Figure 4 shows the basic hardware components of the set top terminal 220. The set top terminal 220 has a tuner  
10 603, digital demodulator 606, decryptor 600, and demultiplexers 609, 616 as well as audio equipment 612 and a remote control interface 626 for receiving and processing signals from the remote control unit 900. An optional modem 627 allows communication between a microprocessor  
15 602 and the cable headend 208. An NTSC encoder 625 provides a standard NTSC video output.

The microprocessor 602 is capable of executing program instructions stored in memory. These instructions allow a user to access various menus by making selections on  
20 the remote control 900.

The manner in which the video is decompressed and the menus are generated from the program control information signal or STTCIS varies depending on the specific embodiment of the invention. Video decompressors  
25 618 and 622 may be used if the video is compressed. The program control information signal may be demultiplexed into its component parts, and a video decompressor 618, graphic decompressor, text generator and video combiner 624 may be used to assist in creating the menus.

30 In addition to the menu format information that is stored in graphics memory, the set top terminal 220 also stores data, tracking those programs that have been selected

for viewing. By gathering this data, the set top terminal 220 can maintain an accurate record of all programs accessed/watched by storing the data in EEPROM or RAM. Subsequently, this data can be transmitted to the cable headend 208, where it can be used in carrying out network control and monitoring functions. Such data transmissions between the set top terminal 220 and cable headend 208 can be accomplished, for example, through upstream transmission over the cable network or over telephone lines through the use of telephone modems. Where upstream transmission over the cable network is used, the set top terminals 220 can complete data transmissions on a scheduled (e.g., using a polling response or status report to respond to polling requests sent from the cable headend 208) or as-needed (e.g., using a random access technique) basis.

Figure 5a shows the front panel of the set top terminal 220, which includes an infrared sensor 630 and a series of LED displays 640. The LED displays 640 may indicate with an icon or a letter (e.g. A-K) the major menu currently selected by the set top terminal 220 or the channels selected directly by a user, or menu channel selections (e.g., from 1 to 50). Further displays may include current channel, time, volume level, sleep time, parental lock (security), account balance, use of a hardware upgrade, second channel being recorded by VCR, use of the Level D music hardware upgrade in a separate room, and any other displays useful to a subscriber to indicate the current status of the set top terminal 220. The LEDs 640 may also provide an indication of the digital audio channel currently tuned.

The set top terminal 220 includes a flapped opening 635 on its front that allows the insertion of a magnetic

cartridge (or similar portable storage device, including optical disk, ROM, EPROM, etc. not shown). This cartridge opening 635 allows the set top terminal 220 to be upgraded or reprogrammed locally with the use of a magnetic tape cartridge.

On the top or cover of the set top terminal 220 are located pushbutton controls 645. Any function that can be performed on the remote 900 may also be performed at the set top terminal 220 using the duplicative pushbutton controls 645.

Figure 5b shows the back of the set top terminal 220, which includes a pair of output terminals 650, pair of input terminals 652, pair of stereo/audio output terminals 654, satellite dish input port 656, telephone jack 658 and an RS-422 port 660. In addition, an upgrade port 662 and a cover plate 664 are held in place by a series of sheet metal screws. One of the output terminals 650 is for a television and the other is for a VCR. The set top terminal 220 is equipped to handle incoming signals on one or two cables using the input terminals 652. The phone jack 658 and an RS-232 or RS-422 port 660 are provided for maintenance, trouble shooting, reprogramming and additional customer features. In alternate embodiments, the telephone jack 658 may be used as the primary mode of communication between the cable headend 208 and the set top terminal 220. This connection is possible through the local telephone, cellular telephone or a personal communications network (PCN).

The basic programming of each set top terminal 220 is located on ROM within the set top terminal 220. Random access memory, the magnetic cartridge capability, and the expansion card slot 635 each allow upgrades and changes to be easily made to the set top terminal 220.

In the preferred embodiment, the set top terminal 220 includes a hardware upgrade port 662, in addition to expansion card slots. The hardware upgrade port 662 accommodates a four-wire (or more) connection for: (1) error corrected, decrypted data output of the set top terminal 220, (2) a control interface, (3) decompressed video output, and (4) a video input port. In the preferred embodiment, multiple wires are used to perform each of the four functions. The four sets of wires are combined in a single cable with a single multipin connector.

In the preferred embodiment, multipin connections may be used for the multiwire cable. The multipin connection 662 may range from DB9 to DB25. A variety of small computer systems interface (SCSI) ports may also be provided. Alternatively, four or more ports may be provided instead of the single port depicted.

Another port 662 is used to attach the various hardware upgrades described below to a set top terminal 220. The preferred embodiment has a number of hardware upgrades available for use with a set top terminal 220, including: (1) a Level A interactive unit, (2) a Level B interactive unit, (3) a Level C interactive unit with compact disc capability, (4) a Level D digital radio tuner for separate room use, and (5) a Level E information download unit. Each of these upgrades may be connected to the set top terminal 220 unit through the upgrade port 662 described earlier. The same four wires in a single cable described earlier may be used.

Existing set top converter boxes such as those made by Scientific Atlanta or General Instruments are presently unequipped to handle the menu selection system of the present invention. Thus, hardware modifications are

necessary in order to use the menu selection system with existing set top converter technology.

5 A Turbo Card addition to a set top converter is depicted in Figure 6. The Turbo Card 700 shown provides the additional functionality needed to utilize the menu system with existing set top converter technology. The primary functions the Turbo Card 700 adds to the set top converter are the interpreting of program control information signals, generating of menus, sequencing of menus, and, ultimately, 10 the ability of the viewer to select a channel through the menu system without entering any channel identifying information. The turbo card also provides a method for a remote location, such as the cable headend 208, to receive information on programs watched and control the operation of the set top 15 converter and Turbo Card 700. The programs watched information and control commands may be passed from the cable headend 208 to the Turbo Card 700 using telephone lines.

20 The primary components of the Turbo Card 700 are a PC chip CPU 702, a VGA graphic controller 704, a video combiner 706, logic circuitry 708, NTSC encoder 710, a receiver 712, demodulator 714, and a dialer 716. The Turbo Card 700 operates by receiving the program control information signal from the cable headend 208 through the 25 coaxial cable. The logic circuitry 708 of the Turbo Card 700 receives data, infrared commands, and synchronization signals from the set top converter. Menu selections made by the viewer on the remote control 900 are received by the set top converter's IR equipment and passed through to the 30 Turbo Card 700. The Turbo Card 700 interprets the IR signal and determines the program (or menu) the viewer has selected. The Turbo Card 700 modifies the IR command to

send the program selection information to the set top converter 221. The modified IR command contains the channel information needed by the set top converter. Using the phone line and dialer 716, the Turbo Card 700 is able to transmit program access information to the cable headend 208.

In the preferred embodiment, program access information, that is what programs the viewer watched, is stored at each set top terminal 220 until it is polled by the network controller 214 using a polling request message format as shown in Figure 7a. This frame format 920 consists of six fields, namely: (1) a leading flag 922 at the beginning of the message, (2) an address field 924, (3) a subscriber region designation 926, (4) a set top terminal identifier 928 that includes a polling command/response (or P/F) bit 930, (5) an information field 932, and (6) a trailing flag 934 at the end of the message. Figure 7b shows a response frame format 920' (similar to the frame format 920 end, therefore, commonly numbered with the frame depicted in Figure 7a, but with the prime indicator added for clarity) for information communicated by the set top terminal 220 to the network controller 214 in response to the polling request of Figure 7a.

The eight-bit flag sequence 922 that appears at the beginning and end of a frame is used to establish and maintain synchronization. Such a sequence typically consists of a "01111110" bit-stream. The address field 924 designates a 4-bit address for a given set top terminal 220. The subscriber region designation 926 is a 4-bit field that indicates the geographical region in which the subscriber's set top terminal 220 is housed. The set top terminal identifier 928 is a 16-bit field that uniquely identifies each set top terminal 220 with a 15-bit designation followed by an



appended P/F bit 930. Although field size is provided by this example, a variety of sizes can be used with the present invention.

5       The P/F bit 930 is used to command a polling response from the set top terminal 220 addressed, as described below. The response frame format 920' also provides a variable-length information field 932' for other data transmissions, such as information on system updates. The frame format 920' ends with an 8-bit flag (or trailing flag) 934' that is  
10       identical in format to the leading flag 922', as set forth above. Other frame formats (e.g., MPEG) will be apparent to one skilled in the art and can be easily adapted for use with the system.

15       As summarized above, images or programs may be selected for display by sequencing through a series of menus. Figure 8 is an example of one possible structure for a series of menus. Generally, the sequence of menus is structured with an introductory menu, a home menu, various major menus and a multitude of submenus. The submenus can include  
20       promo menus and during program menus. For example, at the home menu portion of the sequence of menus and corresponding software routines, a subscriber may select one of the major menus and start a sequence of menu displays. Alternatively, a subscriber may go directly to a major menu by  
25       depressing a menu select button on remote control 900.

At any time during the menu sequence, the subscriber may depress a major menu button to move into another series of menus. In this way, a subscriber may move from major menu to major menu.

30       The various software subroutines executed by the microprocessor 602 allow a subscriber to sequence the menus, navigating through the various menus of the present

invention. A subscriber may sequence back through menus or return to the home menu with a single touch of the home menu button on remote 900.

5 An introductory menu screen 1000 automatically appears upon power-up and initialization of the set top terminal 220. From this introductory menu screen 1000, the set top terminal software will normally advance the subscriber to the home menu screen 1010. The home menu 1010 is the basic menu that the subscriber will return to in  
10 order to make the first level of viewing decisions. When the set top terminal software is displaying the home menu 1010, the subscriber is able to access any television programming option. The software allows programming options to be entered through cursor movement on the screen and directly  
15 by button selection on the remote control 900.

In the normal progression through the menu screens, the software will forward the subscriber to a major menu screen 1020 in response to the subscriber's remote control 900 selection or highlighted cursor selection from the home  
20 menu screen 1010. The selections displayed on the home menu 1010 are for large categories of programming options.

Following the major menu 1020, the subscriber may navigate through one or more submenu screens 1050 from which the subscriber may choose one particular program for  
25 viewing. For most programming selections, the user will proceed from the home menu 1010 to a major menu 1020 and then to one or more submenus 1050. However, for certain programming options or functions of the set top terminal 220, the user may skip one or more menus in the  
30 sequence.

The During Program Menus 1200 are submenus enabled by the set top terminal software only after the

subscriber has selected a television program. These menus provide the subscriber with additional functionality and/or additional information while viewing a selected program. The During Program Menus 1200 sequence can be further subdivided into at least two types of menus, Hidden Menus 1380 and Program Overlay Menus 1390.

To avoid disturbing a subscriber during viewing of a program, the Hidden Menus 1380 are not shown to the subscriber but instead "reside" at the set top terminal 220 microprocessor 602. The microprocessor 602 awaits a button entry either from the remote control 900 or set top terminal 220 buttons before executing or displaying any Hidden Menu 1380 options. The set top terminal software provides the subscriber with additional functions such as entering an interactive mode or escaping from a selected program through use of Hidden Menus 1380.

Program Overlay Menus 1390 are similar to Hidden Menus 1380. However, the Program Overlay Menus 1390 are overlaid onto portions of the displayed video and not hidden. The software for the Program Overlay Menus 1390 allows the subscriber to continue to watch the selected television program with audio but places graphical information on a portion of the television screen. Most Program Overlay Menus 1390 are graphically generated to cover small portions of video. Some Overlays 1390 which are by their nature more important than the program being viewed will overlay onto greater portions of the video. Examples of types of overlay menus 1390 include Notification Menus 1392 and Confirmation Menus 1394. In the preferred embodiment, the software for the Program Overlay Menus 1390 controls the reduction or scales down the (entire)

programs video and redirects the video to a portion of the screen.

Submenus provide the cost of viewing the program and the program's length in hours and minutes. From the submenus, the subscriber is given at least three options: (1) to purchase a program, (2) to return to the previous menu, and (3) to press "go" and return to regular TV. The subscriber may also be given other options such as previewing the program.

Using an on-screen menu approach to program selection, there is nearly an unlimited number of menus that can be shown to the subscriber. The memory capability of the set top terminal 220 and the quantity of information that is sent using the program control information signal are the only limits on the number of menus and amount of information that can be displayed to the subscriber. The approach of using a series of menus in a simple tree sequence is both easy for the subscriber to use and simply implemented by the set top terminal 220 and remote control device 900 with cursor movement. A user interface software programmer will find many obvious variations from the preferred embodiment described.

The set top terminal 220 generates and creates menus using, in part, information stored in its graphics memory. A background graphics file 800 will store menu backgrounds and a logo graphics file will store any necessary logos. A menu display and cursor graphics file will store menu display blocks and cursor highlight overlays as well as any other miscellaneous files needed to build the menus. Using this method of storing menus, the menus can be changed by reprogramming the graphics memory of the set top terminal

220 through instructions from either the network controller 214 or operations center 202.

5       The microprocessor 602 performs the steps required to create a menu using stored information. The microprocessor 602 fetches a background file, logo file, menu display and cursor file in most instances. The microprocessor 602 fetches text from long-term, intermediate-term, or short-term storage depending on where the text is stored. Using a video combiner (or like device), the stored  
10       information is combined with video and the entire image is sent to the television screen for display.

      In the preferred embodiment, a graphics controller is used to assist the set top terminal 220 in generating menus. Menu generation by the set top terminal 220 begins with the  
15       building of a major menu screen, which includes background graphics for that major menu. The background graphics may include an upper sash across the top of the screen and a lower sash across the bottom of the screen. The background graphics may be generated from the background graphics file  
20       800 in the memory files of the graphics memory (preferably EEPROM). In addition, logo graphics may be generated. Such graphics typically include an icon window, a cable company logo, a channel company logo, and two "go" buttons.

      Preferably, the text for each major menu is generated  
25       separately by a text generator in the set top terminal 220. Those portions of the text that generally remain the same for a period of weeks or months may be stored in EEPROM or other local storage. Text which changes on a regular basis, such as the movie titles (or other program selections), is  
30       transmitted to the set top terminal 220 by either the operations center 202 or the network controller 214 of the cable headend 208. In this manner, the cable headend 208

may change the program selections available on any major menu 1020 by modifying the program control information signal sent by the operations center 202 and transmitting any changes using the STTCIS.

5           Day, date and time information are added to each major menu. This information is sent from the operations center 202, the cable headend 208 (signal processor 209 or network controller 214), the uplink site, or generated by the set top terminal 220 internally.

10           The creation and display of program description submenus is performed by the set top terminal 220 in a manner similar to that described above. Each submenu may be created in parts and combined before being sent to the television screen. Preferably, background graphics and upper  
15           and lower sashes are used. Likewise, a video window and half-strip window can be generated from information in storage on the EEPROM.

          In addition to graphics and text, some submenus include windows that show video. Such video may be still or  
20           moving pictures. Still pictures may be stored in a compressed format (such as JPEG) at the set top terminal 220. Video stills may be transmitted by the operations center 202 through the program control information signal from time to time.

25           Moving video picture is obtained directly from a current video feed as described above. Depending on video window size, this may require manipulation of the video signal, including scaling down the size of the video and redirecting the video to the portion of the menu screen which is within  
30           the video window of the menu. Alternatively, the video may be obtained from a split screen channel. Such a method involves the use of split screen video techniques to send

multiple video clips on a single channel at a given time. The set top terminal 220 would scale the picture, if necessary, and redirect it to the correct position on the screen using known scaling and positioning techniques. Additional  
5 circuitry may be required in the set top terminal 220 to perform adequate scaling and repositioning.

To avoid the need for redirecting video into the portion of the screen which houses the video window, masking and menu graphics may be used to cover the portions of the  
10 channel video that are not needed. This masking technique allows the split screen video to remain in the same portion of the screen that it is transmitted by the operations center 202. The masking is then adjusted to cover the undesired portions of the screen. These masks are stored in the  
15 background graphics file similarly to other background files for menus.

The split screen video technique may also be used for promoting television programming. Since a great number of short video clips may be sent continuously, full or partial  
20 screen promotionals (or informationals) may be provided to the subscriber. With this large quantity of promotional video, the subscriber is given the opportunity to "graze" through new movie or television programming selections. The subscriber simply grazes from promotional video to  
25 promotional video until the desired television program is discovered.

### C. Detailed Description of Advanced Set Top Terminal

#### 30 1. Overview

The present invention relates to advances in the set top terminal 220 described above. In particular, the present invention may be achieved through a set of hardware

upgrades or additions to the following embodiments: (1) an existing set top converter (not shown) upgraded with a Turbo Card 700 or the like; (2) an industry standard digital decompression converter box (as shown in Figures 9a and 9b below) upgradeable by either an upgrade module or a menu generation card; or (3) a set top terminal 200 capable of both decompression and menu generation. The set of hardware upgrades described below can be used to provide additional advanced features and functional capabilities to any of these embodiments.

Table A shows several exemplary hardware configurations that may be used to achieve the goals of the present invention. In particular, Table A shows four columns of set top converter technology, which may be modified to produce the various set top capabilities shown in the three rows of the table.

**TABLE A**

	Existing Analog Set Top Converter	Set Top Converter With Digital Decompression Capability	Set Top Converter With Digital Decompression and Menu Generation Capabilities	Advanced Set Top Terminal
Decompression Capability	N/A	Built-In	Built-In	Built-In
Menu Generation Capability	Turbo Card	Upgrade Module or Menu Generation Card	Built-In	Built-In
Advanced Features	Level A-C Hardware Upgrades or Expansion Card	Level A-E Hardware Upgrades or Expansion Card	Level A-E Hardware Upgrades or Expansion Card	Built-In

The table shows the various inherent functional capabilities of each set top converter, and how each may be modified or upgraded, if necessary, to achieve the objectives of the present invention. From left to right, the columns of the table span the various alternatives for balancing those capabilities that may be built into set top converters or terminals, on the one hand, and those capabilities that can be provided through, for example, an upgrade module.



expansion card or hardware upgrade of the present invention, on the other. This balance allows a designer or manufacturer of set top converters to choose between adding advanced functionality to an existing converter box or, instead, producing a converter with additional built-in features that increase cost and complexity of the converter or terminal.

The first column of Table A shows how an existing analog set top converter can be modified to provide menu generation capability through the use of the Turbo Card. In addition to the Turbo Card, such an existing analog set top converter may be further modified to provide any of the advanced features described below through the use of the Level A, Level B and Level C hardware upgrades or an expansion card. Such existing set top converter boxes are currently manufactured by Scientific Atlanta and General Instruments, among others. These converter boxes have been designed for use with analog waveforms and, as a result, digital decompression capabilities are not applicable.

The second column of Table A shows a set top converter with digital decompression capability. This converter is a simple decompression box which may eventually become the industry standard. The simple decompression boxes may be modified to provide the enhanced functionality of the present invention. For example, a simple decompression box may be modified to produce menu generation capability through the use of an upgrade module or menu generation card. In addition, other advanced features may be added to a simple decompression box through modifications that include any of the Level A through E hardware upgrades or an expansion card. Each of these modifications are described below.

The third column of Table A shows a set top converter that has built-in digital decompression and menu generation capabilities. Thus, in order to achieve the enhanced functionality of the present invention, other advanced features may be provided through hardware modification. Such modification may be accomplished through the use of any of the Level A through E hardware upgrades or the expansion card, as explained below.

The fourth column of Table A shows an advanced set top terminal having decompression, menu generation, and advanced functional capabilities. Each of these capabilities are built in to the terminal itself. In this way, achieving the enhanced performance of the set top terminal in accordance with the present invention would require no hardware modification.

In the preferred embodiment, the advanced set top terminal 220 of the present invention has the capability, among other things, of receiving tiered programming from the network controller. Tiered programming allows different users to view different video even though the subscribers are "tuned" to the same channel. For example, the network controller 214 may know the demographics of its subscribers through a database, by "learning" from prior subscriber choices, from an interactive selection, or from other means. Using the demographics information, the network controller 214 may target commercials to the correct audience by showing different commercials to subscribers with different demographics. Even though subscribers will believe they are "tuned" to one channel, each subscriber will be switched to a different channel for the tiered video. Alternatively, subscribers may be offered an option of several commercials from which to choose.

To accommodate foreign speaking subscribers, multiple audio channels for television programming may be provided. In this way, the subscriber may be shown menus of programs available in the subscriber's native language. The function of  
5 choosing the correct audio to correspond to the selected language may be handled by either the set top terminal 220 or the network controller 214 depending upon the configuration. Local programming in several languages or additional audio channels for a foreign language translation of  
10 a popular television program may be provided by the network controller 214. Using a picture-on-picture feature, sign language may be similarly made available to certain set top terminals 220 for the deaf. Also, a text overlay may easily be produced on the lower part of the screen for the deaf.

15 Typically, each video signal is received at the set top terminal 220 along with four audio channels. Two of these audio channels will preferably be used for left and right stereo audio reception of the video signal being displayed. The remaining two audio signals may be used for alternative  
20 languages. For example, where a video signal is received by the set top terminal 220, two of the audio channels will provide the stereo audio signals for that video in English, with the other two audio channels providing mono audio signals in French and Spanish. In this way, each video signal  
25 received at the set top terminal 220 can accommodate at least two foreign languages. Where stereo audio channels are not desired, the audio channels in English can be set to a single signal, providing mono audio reception, and increasing the multiple language audio channel capability to three  
30 foreign languages.

In other embodiments, the network controller 214 can act as a central computer and provide intra-set top terminal

interactive games, inter-set top terminal interactive games, computer bulletin board type services, message services (Electronic mail) etc. For example, a subscriber may play war games with five (anonymous) fellow subscribers each in their own home each operating a separate tank. The network controller 214 gathers the players via set top terminal 220 communications and acts as the referee. A bulletin board or message system can be set up to discuss a particular program such as "Twin Peaks Whodunit" for enthusiasts. These interactive features are further described below with the interactive services level B menu and the set top terminal hardware upgrade level B interactive unit.

In order to achieve the required throughput of video and audio information for the system, digital compression techniques for video are employed. As a result, the set top terminal 220 typically must decompress any digitally compressed program signals that it receives. Methods of decompression are a function of the compression technique used in the program delivery system.

There are three basic digital compression techniques: within-frame (intraframe), frame-to-frame (interframe), and within-carrier compression. Various compression methods may be used with these techniques. Such methods of compression, which include vector quantization and discrete cosine transform methodologies, are known to those skilled in the art.

Several standard digital formats representing both digitizing standards and compression standards have also been developed. For example, JPEG (joint photographic experts group) is a standard for single picture digitization. Motion picture digitization may be represented by standards such as MPEG or MPEG 2 (motion picture engineering group

specification). In addition to these standards, other proprietary standards have been developed. Although MPEG and MPEG 2 for motion pictures are preferred in the present invention, any reliable digital format with compression may be used.

Various hybrids of the above compression techniques and methods have been developed by several companies including AT&T, Compression Labs, Inc., General Instruments, Scientific-Atlanta, Philips, and Zenith. Any of the compression techniques developed by these companies, as well as other techniques known to those skilled in the art, may be used with the present invention.

2. Advanced Set Top Terminal Major Components and Upgrades

a. Decompression Box with Upgrade Module

The preferred program delivery system uses digitally compressed signals and, as a result, the preferred subscriber equipment configuration must be capable of decompressing and processing such digitally compressed signals. Figure 9a diagrams the basic interplay between an upgrade module 700 and a simple decompression box 302. The upgrade module 300 can be connected to the decompression box 302 through a port similar to the upgrade port 662 described above (Figure 5b). The simple decompression box 302 shown is preferably a future industry standard decompression box capable of communicating with an upgrade module 300 to enhance functionality.

The upgrade module 300 provides menu generation capability to the simple decompression box 302. The microprocessor of the simple decompression box 302 communicates with the microprocessor in the upgrade

module 300 to provide the full functionality of a set top terminal 220.

5 In the preferred embodiment, multipin connections may be used for a multiwire cable connecting the simple decompression box 302 with the upgrade module 300. The multipin connection may range from DB9 to DB25. A SCSI, or small computer systems interface, port (not shown) may also be provided. Alternatively, four or more ports may be provided instead of the single port depicted. If a port is not  
10 provided, the upgrade module may, alternatively, be hard-wired to the simple decompression box 302.

As represented generally at 304, the digital data set of output wires of the simple decompression box 302 will preferably output error corrected and decrypted data to the  
15 upgrade module 300. The second set of wires, providing the interface connection, allows the microprocessor in the upgrade module 300 to communicate with the microprocessor of the simple decompression box 302. In this manner, the video circuitry of the upgrade module 300 and the simple decompression box 302 may maintain  
20 synchronization. The third set of wires, providing the decompressed video output, provide the upgrade module 300 with a decompressed video signal to manipulate. The fourth set of wires, comprising the video input set, allows the  
25 simple decompression box 302 to accept a video signal that is a combined text, graphics, and video signal.

Figure 9a further shows the CATV input 306, video input 308, and video and audio outputs 310, 312, as part of the simple decompression box 302. This embodiment  
30 reduces the component cost of upgrade module 300, and thus, is preferred. The upgrade module 300 may simply be a cartridge (not shown) insertable into the simple

decompression box 302. Alternatively, as shown in commonly numbered Figure 9b, the CATV input 306, video input 308 and video and audio outputs 310, 312 may be included as part of the upgrade module 300. In this embodiment, the simple decompression box 302 is primarily used for decompressing the video.

Referring to Figure 10, the upgrade module 300 preferably includes the following circuitry: a video graphics and text demultiplexer 314; a text and graphics video plane combiner 316; a run length graphics decompressor 318; and, a run length compressed graphics memory 320 (nonvolatile RAM, ROM, EPROM, or EEPROM). By means of communications through the multiwire connection between the upgrade module 300 and the simple decompression box 302, compressed video and control signals may be demultiplexed by the demultiplexer 314 within the upgrade module 300. The run length graphics decompressor 318, through communications with the run length compressed graphics RAM 320, permits decompression of the input compressed video signal. The text and graphics video plane combiner 316 allows demultiplexed and decompressed signals to be output, through the simple decompression box 302, to a subscriber's television 222 showing both video and overlay menus with text.

Figure 10 shows the elements of a simple decompression box 302 (numbered commonly with the elements of the set top terminal 220 depicted in Figure 4) with the upgrade module 300 described above. Generated menus and video are combined in the combiner 316 and output to an antitaping encoder 619. Any method of antitaping encoding known by those skilled in the art may be used with the present invention.

Figure 10 also depicts an expansion card 320 and an expansion card interface 320 for receiving the card 320. In addition, error correction circuitry 324 is shown receiving the demodulated signal, prior to demultiplexing the signal.

5       The enhanced functionality of the upgrade module 300 may alternatively be included on the expansion card 320. In this embodiment, the upgrade module 300 becomes an internal component of the simple decompression box 302 and internally upgrades the box 302 to include menu  
10       generation capability without using an external hardware upgrade module 300. Other variations in the upgrade module 300 configuration are also possible.

15                   b. Upstream Data Transmission Hardware

Figure 11 shows a preferred set top terminal 220 that includes a data receiver 332 and a data transmitter 344. The data transmitter 344 provides upstream data communications capability between the set top terminal 220 and the cable  
20       headend 208. Upstream data transmissions are accomplished using the polling system described with reference to Figures 7a and 7b above, and, in particular, using a data transmitter 344. Both receiver 332 and transmitter  
25       344 may be built into the set top terminal 220 itself or added through an upgrade module 300. Regardless of the specific hardware configuration, the set top terminal's data transmission capabilities may be accomplished using the hardware shown in Figure 11.

Figure 11 shows RF signals, depicted at 330, being  
30       received at by a data receiver 332 and tuner 603 working in unison. Both of these devices are interfaced with the microprocessor 602, which receives inputs, depicted at 338, from the subscriber, either through the set top terminal's



keypad 645 or remote control unit 900. All cable signals intended for reception on the subscriber's TV are accessed by the tuner 603 and subsequently processed by the processing circuitry 340. This processing circuitry 340 typically includes additional components for descrambling, demodulation, volume control and remodulation on a Channel 3 or 4 TV carrier.

Data targeted to individual set top terminals 220 is received by the data receiver 332 according to each set top terminal's specific address or ID (e.g. set top ID 928, 928'). In this way, each addressable set top terminal 220 only receives its own data. The data receiver 332 may receive set top terminal specific data in the information field of the program control information signal frame described with reference to Figure 7a or on a separate data carrier located at a convenient frequency in the incoming spectrum.

Any received data includes information regarding channels and programs available for selection. The subscriber may enter a series of commands using the keypad 645 or remote control 900 in order to choose a channel or program. Upon receipt of such commands, the set top terminal's microprocessor 602 instructs the tuner 603 to tune to the proper frequency of the channel or program desired and subsequently instructs the processing circuitry 340 to begin descrambling of this channel or program.

Upon selection of a channel or program, the microprocessor 602 stores any selection information in local memory for later data transmission back to the cable headend 208. Typically, the data transmitter 344 operates in the return frequency band between 5 and 30 MHz. In an alternative embodiment, the frequency band of 10 to 15 MHz may be used. Regardless, however, of the frequency band

used, the data transmitter 344 sends information to the cable headend 208 or network controller 214 in the information field of the frame described with reference to figure 7b. Those skilled in the art will recognize that a number of variations and combinations of the above-described set top terminal 220 hardware components may be used to accomplish upstream data transmissions.

c. Hardware Upgrades

In order to enhance a set top terminal's 220 functionality, the following hardware upgrades may be used: (1) a Level A interactive unit, (2) a Level B interactive unit, (3) a Level C interactive unit with compact disc capability, (4) a Level D digital radio tuner for separate room use, and (5) a Level E information download unit. Each of these upgrades is connected to the set top terminal 220 unit through the upgrade port 662 described earlier.

Level A, B and C hardware upgrades have similar hardware components. Figure 12a diagrams the basic components of the Level A, B and C hardware upgrades, indicated generally at 100. The figure diagrams the interaction between the hardware upgrades 100 and the set top terminal's 220 basic components. As seen in the figure, CATV input signals are received by the set top terminal 220 using a tuner 603 and various receiver components described above (but denoted generally at 601 in Figures 12a and 12b). The set top terminal's microprocessor coordinates all CATV signal reception and also interacts with various upstream data transmission components 604, which have been described above.

The Level A, B and C hardware upgrades 100 each include a microprocessor 104, interactive software 106, processing circuitry 108, bubble memory 112, and a long-

term memory device 116. In addition to these basic components, the Level B hardware upgrade makes use of an additional telephone modem 120, while the Level C hardware upgrade makes use of an additional CD-ROM storage device 122.

5           Along with their basic components, the Level A, B and C hardware upgrades 100 each use their own interactive software 106. This software may be used to provide the enhanced functional capabilities described below. The Level  
10   A, B and C hardware upgrades also make use of processing circuitry 108, which allows the set top terminal 220 to pass the subscriber's interactive input to the Level A, B and C hardware upgrades 100 for interpretation. These commands  
15   are passed through the interface linking the set top terminal's microprocessor with the microprocessor of the Level A, B and C hardware upgrades 100. In this way, subscriber inputs, entered through the set top terminal keypad or remote control, can be transferred to any of the  
20   hardware upgrades for processing and responses generated therein can then be sent back to the set top terminal 220 for display. In the preferred embodiment the IR commands are transferred from set top terminal to hardware upgrade.

          The Level A, B and C hardware upgrades 100 also include a long-term memory component or device 116 that  
25   allows each hardware upgrade to internally store data used with each interactive service. Such data may include, for example, customized menu templates used by the individual interactive services. In addition, the Level A, B and C hardware upgrades include a bubble memory 112 for the  
30   temporary storage of, for example, interactive questions and responses used in each particular interactive service.

The Level A interactive unit allows the subscriber to access interactive services offering additional information about programs such as quizzes, geographical facts, etc. This information may be received by the set top terminal 220 in several data formats, including using the vertical blanking interval (VBI) or the program control information signal. The Level A interactive unit enables the subscriber to engage in textual interactivity with the current television program using overlay menus. Some examples are quizzes, fast facts, more info, where in the world, products, etc, all of which provide the subscriber with an interactive question and answer capability. Although the Level A interactive capability can easily be built into the set top terminal 220, such an embodiment increases the cost of the basic set top terminal 220.

The Level B interactive unit provides the user with access to online data base services for applications such as home shopping, airline reservations, news, financial services, classified advertising, home banking, and interactive teletext services. For example, with this upgrade, a user will be able to reserve plane tickets or buy consumer electronics. The primary feature of this upgrade unit is that it allows actual transactions using two-way communications over modem with outside services. This added two-way communications capability may be with the cable headend 208 or, alternatively, over cellular networks, PCN or other communications media.

The Level C interactive unit employs a high volume local storage capacity, including compact disc or other random access digital data formats (e.g., CD-ROM 122). This unit allows use of interactive multi-media applications. Such applications include, for example, computer games, multi-

media educational software, encyclopedias, other reference volumes (e.g. Shakespeare library), etc. In the preferred embodiment, many of these applications will interact with live programming providing additional information and interactivity to the basic program feed. For example, a viewer watching a show set in a foreign country may be able to retrieve additional information, maps, economic data, as well as other information about that country that are stored on the compact disc. In the Level C applications, the upgrade hardware may closely monitor the television broadcast through additional data channels (e.g., vertical blanking interval, or other digital data encoded within live video) providing context sensitive interactivity.

Figure 12b diagrams the interaction between the set top terminal 220 and the Level D hardware upgrade, indicated generally at 130. As shown in the figure, the CATV signals are input to the set top terminal 220 through its tuner 603 and receiver components 601. As described above, the microprocessor 602 coordinates all cable television signal reception by the set top terminal 220. The Level D hardware upgrade 130 makes use of a microprocessor 132, a tuner 134, a demodulator 136, a demultiplexer 138, a decryptor 140 and an audio decompressor 142.

As shown in the figure, the set top terminal 220 and the Level D hardware upgrade 130 interact through the interface linking the respective devices. The set top terminal's microprocessor 602 instructs received signals to be transferred to the Level D hardware upgrade 130 for further processing. These received signals are input to the Level D hardware upgrade, passed through the signal path comprising the tuner 134 and other digital audio reception components (i.e., demodulator 136, demultiplexer 138,

decryptor 140 and audio decompressor 142). Through the use of the hardware as configured in Figure 12b, the subscriber can select a digital audio program for listening. The subscriber can accomplish such selection through a subscriber interface (not shown), which may exist at the set top terminal 220 or, alternatively, at the Level D hardware upgrade.

The Level D hardware upgrade allows the subscriber separate access to the digital radio channels while other programming (not necessarily radio) is being viewed on the television. Typically, this upgrade would be used for digital radio usage in a separate room from that of the television. The upgrade has a separate tuner, decompressor, and visual display. In the preferred embodiment a second remote control (which is preferably a scaled-down version of the set top terminal remote control, described below) is provided to access the digital audio system. This remote is equipped with a display.

The Level E hardware upgrade allows the subscriber to download large volumes of information from the operations center 202 or cable headend 208. The Level E hardware upgrade will enable subscribers to download data, such as books and magazines, to local storage. Primarily, the Level E hardware upgrade is an additional local storage unit (e.g., hard disk, floppy, optical disk or magnetic cartridge). Preferably, a small portable reader, called "EveryBook™", is also provided with the upgrade to enable downloaded text to be read without the use of a TV. The portable reader is equipped with a screen.

The downloadable information may be text or video supplied by the operations center 202 or cable headend 208. With this upgrade, books may be downloaded and read

anywhere with the portable reader. Using this upgrade, video may be downloaded and stored in compressed form for later decompression. The video would be decompressed only at the time of viewing. Important text that the public desires  
5 immediate access may made available through this system. Text such as the President's speech, a new law, or a recent abortion decision rendered by the Supreme Court may be made immediately available.

Using a more sophisticated port, such as the SCSI port,  
10 multiple hardware upgrade units may be connected, or "daisy-chained" together, to operate simultaneously. Although these upgrade units are described separately, the units may be combined or built into the set top terminal 220. Those skilled in the art will recognize variations on such  
15 combinations of and additions to the set top terminal hardware.

d. Expansion Card Slot

In order to provide the greatest flexibility possible and prevent a set top terminal 220 from becoming outdated  
20 during the terminal's useful life, additional electronic expansion card slots have been built into the preferred embodiment. The expansion slots 665 (depicted in phantom in Figure 5b) are covered by the metal plate cover 664 as shown in Figure 5b. It is anticipated that additional memory  
25 or capabilities may be needed for certain customer features and also to update the system as the cable delivery system's capabilities increase.

In addition to providing an additional memory capability, the expansion card slot provides an easy method to  
30 upgrade the set top terminal hardware. In particular, expansion cards can be used to internally provide any of the Level A through E hardware upgrade features described above.

Such embodiments, however, use the upstream data transmission hardware, also described above (or built-in modem).

Functionally, the expansion card (not shown) may be  
5 inserted into an expansion card slot 665, causing the  
connector on the expansion card to electrically link with a  
connector on the set top terminal 220. Preferably, the frame  
of the set top terminal has a shelf or rack position to hold the  
expansion card. The connector on the set top terminal 220  
10 may simply be an electrical connection to the set top  
terminal's microprocessor and/or memory device or devices.  
Alternatively, the interface between the expansion card and  
the set top terminal 220 may be an electrical bus that allows  
the memory resources of the set top terminal 220 to be  
15 directly expanded. In this case, the expansion card itself  
contains a memory device or devices that expand the amount  
of program information or data that the set top terminal 220  
may access. Such memory devices include RAM, ROM,  
EPROM or EEPROM. In addition, the interface may be a  
20 "mailbox," which resides in the set top terminal 220 as a  
single memory location. This embodiment facilitates the  
transfer of data between the set top terminal 220 and the  
expansion card in either serial or parallel format. Such  
transfers are coordinated and controlled by the set top  
25 terminal's microprocessor 602.

The use of expansion cards lowers the cost of the set  
top terminal 220 itself, while also increasing its potential  
functionality. Thus, an expansion card may include enhanced  
functional capabilities described as part of the upgrade  
30 module discussion above and be designed to accommodate  
any hardware upgrade compatible with the set top terminal  
220.



### 3. Remote Control and Subscriber Access of Set Top Terminal

5 The subscriber can access programs televised by the system through the set top terminal 220 using a remote control 900. Figure 13a shows a two-section remote control 900 that accommodates such access. To reduce costs and make the set top terminal 220 as user friendly as possible, a standard television remote control 350, such as a Jerrold RC 10 650 remote control or the like, may be augmented by adding a new section 352 that provides the additional digital menu access and ordering functions. Figure 13a depicts the addition of menu access and cursor movement control to the remote control 900.

15 The remote control 900 has an ordering button 354 and four-way cursor movement 356 that includes a "go" button 358 and menu access buttons 360. The preferred remote control 900 operates using infrared (IR) signals, with the signals being received by the infrared (IR) sensor 630 on 20 the front of the set top terminal 220.

In the simplest embodiment, the remote 900, may be built with only cursor movement and a go button. In more sophisticated embodiments, the remote control 900 may be provided with buttons that are programmable to perform 25 specific functions for a series of entries. An intelligent or smart remote control 900 would increase both the cost and capability of the set top terminal 220 system. Using the augmented remote control 900 depicted in Figure 13a, a subscriber can navigate the program menu system of the set 30 top terminal 220.

Figure 13b shows an alternative and preferred embodiment of the remote control 900 for use in the present invention. Standard television receiver remote control

switches or buttons 362 may be used, including volume control, channel select, power and signal source buttons, as well as other menu buttons 364, including cursor movement, cursor select, menu select, and pay television buttons arranged longitudinally on the remote control 900, as opposed to the width-wise separation, as shown in Figure 13a. The color of the buttons or the surrounding background may differ between the standard television remote control buttons 362 and the menu buttons 264 to differentiate visually between these two groups of buttons.

The width and depth of the remote control unit 900 are considerably less than the length to allow the remote control unit 900 to fit easily within a user's palm. The remote control unit 900 preferably has its center of mass balanced substantially near the longitudinal middle. This balance allows a user's thumb to naturally be placed in substantially the middle portion of the remote control unit 900, when it is picked up by a user.

Since the center of mass of the remote control unit 900 is placed substantially near the longitudinal middle of the remote control unit 900 (thereby having a user's thumb naturally fall in this same center region), the standard remote buttons 362 and menu access switches or buttons 364 most frequently accessed and depressed by a user are placed in the central region of the remote control unit 900 within easy reach of the user's thumb. Channel and volume increment and decrement buttons 366 are placed near this center of mass and longitudinal center line. The channel buttons 366 are preferably beveled in opposing directions to allow a user to feel for and press a desired button without looking down at remote 900. Similarly, the volume buttons 368 are preferably beveled in opposing directions for the same reason.

Additionally, the channel buttons 366 could have a surface texture different from those of the volume buttons 368 to allow even easier differentiation.

Also placed in the longitudinal center, within easy reach of a user's thumb, are cursor movement buttons 370 and a "go" button 372. The "go" button 372 selects an option corresponding to the placement of the cursor. As opposed to buttons, a joystick may be used with a selection on the stick, or a trackball, depressible for selecting a desired choice. The cursor buttons 370 are placed ninety degrees apart, with the "go" button 372 placed within the center of the cursor movement buttons 370, as shown in Figure 13b. The cursor movement buttons 370 are preferably beveled inwardly toward the "go" button 372 and the "go" button 372 is recessed below the level of the cursor movement buttons 370 so that it is not accidentally pressed while depressing the cursor movement buttons 370. In addition to the beveling on the cursor movement buttons 370, these buttons may also have a surface texture to allow a user to feel for and select the appropriate button without looking down at the remote 900 and directional arrows could be raised or recessed on the surface of the cursor movement buttons 370 for this same purpose.

Menu select buttons 374 are placed near buttons 370 as shown in Figure 13b. Menu select buttons 374 are preferably the largest buttons on the remote control unit 900. Menu select buttons 374 preferably have icons or other graphics imprinted on their top surface or adjacent to corresponding buttons. For example, a button for the sports major menu may contain a baseball icon. The icons represent the programming available on the particular major menu selected by the menu select buttons 374. The icons may also be raised

above the level of the menu select buttons to provide a textured surface. This textured surface would allow a user to select an appropriate menu button 374 by feel, without looking at the remote control unit 900. The icons would  
5 require substantial differences in texture, while still providing a meaningful graphic related to the associated menu.

As shown in Figure 13b, labels and icons are provided for the following major menus: movies, sports, children's  
10 programming, documentary/news, entertainment, magazines, programming guide, HDTV (high definition television), interactive TV, music, and an additional button 376 for further programming. Menu select buttons 374 may also be labeled A through J for the above programs, with the last  
15 button for all additional major menus labeled K-Z.

Although the remote control unit 900 is described with a variety of channel selection buttons, nearly all buttons from a standard remote control (section 362 buttons) could be eliminated. The present invention would allow a subscriber  
20 to use a remote control unit 900 containing only menu select buttons 374 and/or cursor movement and select buttons, 370, 374, respectively.

As used herein, "button" is contemplated to include all manner of switches or touch sensitive circuitry to activate a  
25 particular function in the remote control unit 900. Additionally, although the remote control unit 900 communicates with the set top box by means of infrared transmission, other forms of communication are contemplated, including ultra-sound, radio frequency and  
30 other electromagnetic frequency communication.

#### 4. Advanced Features and Functional Capabilities

##### a. Overview

5           In the preferred embodiment, the set top terminal 220 will include features that are now being adopted in the industry, including parental controls and locks, electronic diagnostics and error detection, muting, on-screen volume control, sleep timer, recall of last selection, etc. Each of  
10       these features has a corresponding menu (or overlay menu) that allows on-screen customizing and activation of the feature.

          The preferred set top terminal 220 also supports a number of advanced features and functional capabilities. This  
15       set top terminal 220 provides subscribers with a picture-on-picture capability without requiring a special television to support the capability. The set top terminal 220 also supports a program catalogue Service, which provides subscribers with information on all programming available at  
20       its particular subscriber location. The set top terminal 220 further includes the capability of querying viewers to establish, among other things, favorite channel lists, personal profile data and mood information. The set top terminal 220 allows the subscriber to view promotional menus on future  
25       programming events.

          The set top terminal 220 supports additional capabilities using its hardware upgrades that allow subscribers to use other interactive services, for example, to engage in on-line question and answer sessions, to order and  
30       confirm airline tickets, and to access a variety of other data services. The set top terminal 220 makes use of a digital tuner as a hardware upgrade to provide subscribers with a digital audio capability.

The preferred set top terminal 220 may be used to control video tape machines, thereby simplifying the recording of programs. The set top terminal 220 can, in conjunction with the program delivery system, easily support high definition television (HDTV). For subscribers living in remote locations, the set top terminal 220 accommodates backyard satellite systems.

In addition to all the features that the set top terminal 220 supports with its current internal programming and upgradeability, additional features may be added or existing features increased through remote reprogramming of the set top terminal 220. Utilizing the resident operating system on the read only memory (ROM), the cable headend 208 is able to reprogram the random access memory (RAM) of the set top terminal 220. With this capability, the cable headend 208 can remotely upgrade software on the set top terminals 220.

Reprogramming will occur by using the program control information signal, with the appropriate signals sent over this signal. In an alternative embodiment, one channel is dedicated for the special programming needs. When reprogramming is to occur, the cable head end will send an interruption sequence on the program control information channel that informs the set top terminal 220 that reprogramming information is to follow.

b. Picture-On-Picture Capability

Although the preferred embodiment of the present invention decompresses one channel at a time for the viewer, users who desire a picture-on-picture capability can be provided with a set top terminal 220 have upgraded hardware components that allow two channels to be tuned and decompressed at any given time. Once two signals are available, the picture-on-picture capability can be made fully

available in the set top terminal 220, without requiring a special television.

Figure 15 diagrams one embodiment for implementing the picture-on-picture capability. Such implementation necessarily requires the use of two tuners 603, 603' and two decompressors 618, 618' so that two separate video programs may be displayed simultaneously on the subscriber's television screen. As shown in the figure, the CATV input signal is received by the set top terminal 220 and input into two separate tuners. These tuners will each tune to a separate television program, both of which will be simultaneously displayed on the subscriber's television. The two television programs are extracted from the CATV input signal by the two parallel signals paths depicted in Figure 15.

Each signal path is substantially identical (therefore the components thereof are commonly numbered, with callout numbers of the components of one path carrying the prime indicator) and thus, only one path will be described. Each signal path shown includes a tuner 603, a demodulator 606, a demultiplexor 609, a decryptor 600 and various decompression devices. As the respective signals pass through these devices, the microprocessor 602 coordinates the signal processing to produce a decrypted program signal. The decrypted program signal is further partitioned between audio, on the one hand, and video, graphics and text, on the other. The audio signals extracted are passed to an audio decompressor 612, which further processes the audio for output to the subscriber's television.

The embodiment diagramed in Figure 15 shows only single audio channels for each video channel tuned by the individual tuners. As described above, the number of audio channels will typically include four audio signals

corresponding to a single video channel. At least two of these audio signals may be used for stereo television play. Although the subscriber can view two separate video pictures simultaneously through the picture-on-picture capability, the subscriber's television can only accommodate a single audio signal at a time (or two audio signals for stereo audio reception). Thus, the set top terminal hardware shown in Figure 15 must also include a switch (not shown), which accommodates the simple switching between each audio signal or signals that correspond to one video picture or another. Such an audio switch, which is a component well known in the art, allows the subscriber to listen to the audio of one picture or the other. The video, graphics and text portion of the program signal are routed through another demultiplexor 314, which, in turn, separates all video, graphics and text of the signals. These signal parts are stored in a memory device 620 within the set top terminal 220. This memory device may be a ROM, RAM, EPROM, or EEPROM.

The microprocessor 602 initiates and coordinates further decompression of the video, graphics and text for each of the program signals. Once these signal parts are decompressed within the set top terminal 220, these components are passed to a video combiner 316. The video combiner correlates and combines the video, graphics and text of the two program signals. The video combiner outputs these two signals for display on the subscriber's television. These signals may also pass through an NTSC encoder 625 to produce analog NTSC video waveforms, which may likewise be displayed on the subscriber's television. Such display necessarily requires that each signal pass through an RF modulator 605 in order to be input into a television. In this



way, two separate RF video outputs are produced. Each video signal produced by the RF modulators has its own corresponding audio outputs produced by each audio decompressor.

5        Each video signal (and its corresponding audio signal) produced by the two tuner configuration can be simultaneously displayed on the subscriber's television, which has a picture-on-picture capability, or, alternatively, the set top terminal 220 itself can create the picture-on-picture  
10       image for display. Such display involves the scaling and repositioning of one of the video (and audio) signals so that both pictures produced can be viewed simultaneously. In so doing, the subscriber's television can display one of the pictures as a full screen display, with the other picture being  
15       displayed as a scaled and repositioned display overlayed on the full screen display. To implement such a technique, the set top terminal 220 must include the hardware components necessary to produce a picture-on-picture capability, including hardware capable of scaling, repositioning and  
20       overlaying images. Such an advanced set top terminal 220 allows the subscriber to make use of a picture-on-picture capability even though the subscriber's television cannot alone produce such a result.

c.    Program Catalogue Service

25       Referring to Figure 15 and to Figure 8, in the preferred embodiment of the present invention, program catalogue menu 1100 listing programs available on network schedules, will be available as a major menu of the type shown as 1020. In the preferred embodiment, the major program catalogue  
30       menu 1100 would offer submenus, such as network schedules for the next seven days, today's network schedules for the

next six hours, and TV program catalogue picks for the next seven days.

5 In order for the set top terminal 220 to provide a program catalogue service, the set top terminal 220 must receive information on all programming available at its particular subscriber location. This information will be sent to each set top terminal 220 as part of the program control information signal or STTCIS. The program control information signal would include, among other things, all  
10 programming scheduled for the next 7 days. This programming information would, for example, include the name of each program, the type of program, the program start time, the length of the program, the date the program will be shown, a brief description of the program and  
15 whether or not the program is closed-captioned, among other information.

All programming information sent to the set top terminal 220 for use with the program catalogue service will be stored in the set top terminal's internal memory. Upon  
20 selection of the program catalogue service by the subscriber, the microprocessor accesses the memory device during its menu generation and creation process. In this way, the programming information will be combined with the rogram catalogue menu or submenu template to produce the Program  
25 catalogue service. The program catalogue service may involve the use of more than one menu, especially where the network scheduling information covers time frames longer than a few days.

30 If the particular set top terminal 220 has been subscribed to the program catalogue service, the subscriber may proceed to a submenu showing schedules of programs. If the subscriber chooses the network schedule submenu 1102,

he is offered a list of network schedules to choose from. If a subscriber were to choose, for instance, HBO, an HBO-specific submenu (not shown) would appear and allow a subscriber to choose a date of interest to see what programs are available on that particular date.

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d. Querying Viewer

To support a variety of services, the set top terminal 220 is capable of querying the viewer and recording viewer responses. For example, in order for the set top terminal 220 to establish a favorite channel list as shown at 1100 in Figure 16a depicting the broadcast TV menu 1112, menus querying the subscriber and allowing the subscriber to input his selection of eight favorite channels is displayed.

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After querying the subscriber for a list of popular shows the terminal displays a submenu allowing the subscriber to choose one of the subscriber's favorite or popular shows for viewing. Although various embodiments of menus are possible, the goals of each are the same -- to eliminate or augment printed guides to television programs. In an alternative embodiment, a program viewing suggestion feature is available as an additional feature. This feature gives the indecisive or lazy viewer suggestions as to which programs the viewer should watch. The set top terminal 220 uses a matching algorithm to accomplish this program suggestion feature. This program suggestion feature is described in detail in co-pending patent application Serial NO. \_\_\_\_\_, entitled, REPROGRAMMABLE TERMINAL FOR SUGGESTING PROGRAMS OFFERED ON A TELEVISION PROGRAM DELIVERY SYSTEM, incorporated herein by reference.

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In order for the set top terminal 220 to make decisions on which programs the subscriber should watch, the terminal

must create a personal profile for the particular viewer. From the data in the particular viewer's personal profile and the television program information available in the program control information signal, the set top terminal 220 is able to  
5 select a group of programs which the particular viewer is most likely to watch.

In order for this feature to operate, a personal profile for each viewer can be gathered by the set top terminal 220 and stored in a memory file. The personal profile consists of  
10 demographic information that may be gathered in a number of ways. The set top terminal 220 builds the personal profile for each viewer and stores the information in a memory file by viewer name. To build a personal profile in the preferred system, the viewer answers a series of questions presented  
15 on a series of menu screens. These personal profile screens request the viewer to input information such as name, sex, age, place of birth, place of lower school education, employment type, level of education, amount of television program viewing per week, and the number of shows in  
20 particular categories that the viewer watches in a given week such as, sports, movies, documentaries, sitcoms, etc. Any demographic information which will assist the set top terminal 220 in targeting advertisements to the viewer or suggesting programs may be used.

25 Once a personal profile has been created (in a particular set top terminal 220), it can be indefinitely stored in nonvolatile memory. A selection at the home menu screen 1010 (Figure 8) activates the program selection feature. Following activation of the feature, the set top terminal 220  
30 will present the viewer with a series of brief questions to determine the viewer's mood at that particular time, as shown in Figure 16b. For example, the first mood question

screen 1114 may ask the viewer to select whether the viewer desires a short (30 minute), medium (30-60 minute), or long (60 plus minute) program selection. The second mood question screen 1116 requests the viewer to select between a serious program, a thoughtful program, or a light program, as shown in Figure 16c. And the third mood question screen 1118 requests whether the user desires a passive program or an active program, as shown in Figure 16d. The viewer makes a selection in each question menu, utilizing the cursor movement keys and "go" button on the remote control unit 900.

After the viewer has responded to the mood question menus which determine his mood, the set top terminal 220 uses the personal profile information and mood information to find the best programming matches for the viewer. The set top terminal 220 displays an offering of several suggested programs to the viewer. With this program selection feature, the set top terminal 220 can intelligently assist the specific viewer in selecting a television program.

The personal profile information may also be used in targeting advertisements. In the preferred embodiment, the network controller 214 can target specific advertisements to individual cable distribution network nodes or, alternatively, to individual subscribers. In order to accomplish the advertisement targeting capability, the network controller 214 transmits packages of advertisements to the cable distribution network nodes or subscribers for eventual display on the set top terminal 220. When the video that the subscriber is watching nears a break for a commercial, a specific advertisement or set of advertisements is specifically targeted to a particular set top terminal 220 based on the personal profile information described above. Although the

network controller 214 is the component in the program delivery system which provides this targeting capability, the set top terminal 220 accommodates transparent channel switches to display the targeted advertisement. In this way, although the subscriber thinks that the set top terminal 220 is tuned to a specific channel, an advertisement from another channel is displayed on the subscriber's television.

The hardware required to accommodate such transparent channel switching capabilities are shown in Figures 17a and 17b. Figure 17a shows the set top terminal hardware components which accommodate channel switching within a single 6 MHz channel bandwidth. These components include a tuner 603, a demodulator 606, a demultiplexer 609, a multiplexer 400, a decompressor 622, a microprocessor 602, and local memory M. The tuner 603 operates by tuning to a specific 6 MHz bandwidth which includes the displayed video and a number of channels carrying advertisements. The demodulator 606 processes these signals and sends them to the demultiplexer 609, which converts the received signal into separate program and advertisement signals. During this processing, the microprocessor 602 coordinates the demultiplexing of the programming signals. Once the video signal pauses for a commercial break, the microprocessor 602 instructs the multiplexer 400 to select the advertisement or advertisements for decompression and subsequent display on the subscriber's television. This hardware configuration allows the set top terminal 220 to switch between channels within the 6 MHz bandwidth and display various advertisements for viewing, regardless of the video currently being watched by the subscriber.

Where a targeted advertisement falls outside the tuned 6 MHz bandwidth containing the video that the subscriber is currently watching, the hardware configuration shown in Figure 17b is used. In this configuration, the microprocessor 602 instructs the tuner 603 to retune to another 6 MHz channel bandwidth, as represented by bi-directional arrow A.

Working together, the microprocessor 602 and tuner 603 allow targeted advertisements, which have been transmitted in another 6 MHz bandwidth, to be tuned with minimal acquisition time and delay. In particular, this configuration allows the set top terminal 220 to tune outside a given 6 MHz bandwidth (to another 6 MHz bandwidth) in order to select a targeted advertisement for display. This alternative embodiment may require the use of a full screen mask in order to minimize any annoying screen rolling during the tuning process. The masking is intended to cover any glitches which would otherwise be displayed during the acquisition time (e.g., 0.5 seconds) for retuning to another 6 MHz channel bandwidth.

Where the acquisition time or delay becomes unreasonable, an alternative embodiment (not depicted) can include the use of two tuners similar to the configuration used above for the picture-on-picture capability. This alternative configuration using two tuners trades an increased cost for lower acquisition times. Those skilled in the art will recognize a number of other configurations of set top terminal hardware that will accommodate a transparent channel switching feature. A more detailed description of target advertising and channel switching is provided in patent application Serial No. \_\_\_\_\_, entitled, NETWORK CONTROLLER FOR CABLE TELEVISION DELIVERY SYSTEM, incorporated herein by reference.

e. Promotional Menus

Figure 18 depicts the use of a promotional menu 1120 used to sell subscriptions to services in the system 200. This promotional menu is tailored to Level B interactive services which include a variety of on-line type services such as Prodigy, Yellow Pages, Airline Reservations, etc. A similar menu is used for Level A interactive services that offers subscribers additional information about programs such as quizzes, geographical facts, etc. Such information may be received by the set top terminal 220 in several data formats, including in the vertical blanking interval (VBI) and in the program control information signal.

Other promotion menus similar to menu 1120 may be used for the Level C interactive services. The Level C interactive services utilize local storage such as CD technology (e.g., 122) to offer an enormous range of multi-media experiences. The Level C interactive services require a hardware upgrade as described earlier. Specially adopted CD-I and CD-ROM 122 units are used for this service.

Typically, promotional menus may be generated when a subscriber selects a nonexistent channel, creating a virtual channel. Such virtual channels do not require any additional bandwidth since these channels do not carry any of the data required to create a promotional menu. Instead, when the subscriber selects a channel that does not exist (e.g., Channel 166), a virtual channel is created using data sent to the set top terminal in a number of ways. For example, the data may be sent in the vertical blanking interval (VBI) of another channel, out-of-band, or with the menu information sent from the headend 208 in the set top terminal control information stream (STTCIS). The data will be used to create graphics stored locally at the set top terminal 220 as an NTSC video



signal which may be displayed on the subscriber's television. In this way, a promotional menu may be drawn and a virtual channel is created. This capability simply provides the set top terminal 220 with the ability to display a promotional menu or graphics display whenever a nonexistent channel is selected by the subscriber.

f. Other Interactive Services

Figures 19a and 19b show menus (1130 and 1132, respectively) that are available using the interactive Level A services. Referring to Figure 19a, when interactive Levels A services are available for a television program, the system will display an interactive logo 1134 consisting of the letter "I" and two arrows with semicircular tails. In the preferred embodiment, the set top terminal 220 will place the interactive logo on the television screen as an overlay menu. In the preferred embodiment, the set top terminal 220 will detect that there is data or information available about a television program which can be displayed to a subscriber using the interactive service. When the set top terminal 220 senses that there is interactive information available, it will generate the interactive logo overlay menu 1134 and place it on the television screen. For example, the set top terminal 220 will detect that information on a television program is being sent in the vertical blanking interval (VBI) and generate an interactive logo overlay menu 1134 which will appear on the subscriber's television screen for approximately fifteen seconds during each ten minute interval of programming. Similarly, the set top terminal 220 can sense that the programming has closed caption information available and place a closed caption logo on the screen.

Referring to Figure 19b, when the subscriber sees the interactive logo 1134 on the television screen, the subscriber

is made aware of the fact that interactive services are available in conjunction with his television program. If the subscriber presses the interactive remote control button, another overlay menu 1133 will be generated by the set top terminal 220 and placed on the screen. This overlay menu 1133 is shown in Figure 19b being overlaid on an interactive television program. From this menu 1133, the subscriber may select a variety of different types of textual interactivity with the current television program, as at 1134, including quizzes, fast facts, more info, where in the world, products, etc. At any time during the interactive submenus, the user may return to the television program without interactive features.

Another submenu 1136 gives additional information related to the television program to the viewer in textual form in the lower half of the screen. In Figure 19b, the submenu 1136 shows the available interactive options for the subcategory "quiz." In this interactive subcategory, the user is presented with questions and a series of possible answers. If the subscriber desires, the subscriber selects one of the answers to the quiz question. After the selection, the set top terminal 220 sequences to another menu. The set top terminal 220 sequences to the interactive quiz answers submenu which informs the subscriber whether the correct answer was or was not chosen. Subsequently, another submenu would show correctly or incorrectly answered quiz question.

Figure 20a is an example of a submenu for Level B interactive services. From this menu screen 1141, any of a number of on-line data services could be accessed. One service, the airline reservations selection 1142, has been chosen by the subscriber on this menu.

In selecting airline reservations, the subscriber encounters a sequence of menus as for any on-line data service. Referring to Figure 20b, the subscriber is typically shown a submenu, such as submenu 1144, for the data service offering various options. In each of these submenus related to a data service, the subscriber is able to exit, returning to the home menu 1010 or regular cable TV.

Figure 20b, the airline information and reservation submenu 1144, allows a subscriber to view six available flights. A subscriber may select one of the flights to check on its availability. Another similar submenu allows a subscriber to enter the month, day and year for the availability date desired. In this submenu, the subscriber is offered the option of correcting any errors in the entered information.

Figure 20c is another airline submenu 1150 that allows a subscriber to view remaining seats available on a flight, enabling the selection of a seat assignment. This interactive submenu 1150 is an example of how information may be graphically shown to a subscriber using a portion of the menu and different coloring schemes. In this interactive menu, the lower half of the screen 1152 shows the passenger compartment of an airplane with all the seat locations graphically represented by square blocks. By coloring the available seat locations in blue and the unavailable seat locations in a different color, the menu can present a great deal of information in a limited amount of space. This graphic presentation of information for the interactive on-line data services is an important method of visually displaying large amounts of information to the subscriber.

Referring to Figure 20d, another submenu 1156 allows the subscriber to choose a one-way or round-trip ticket, to confirm reservations and to charge an airline ticket by credit

card, choosing the appropriate strip menu on the lower part of the screen. In this particular menu 1156, the subscriber is charging a round-trip plane ticket on a credit card. The subscriber simply needs to enter the credit card number, expiration date, and credit card type to charge an airline ticket. Other submenus may process the subscriber's credit card charge for the airline ticket, confirm the subscriber's airline ticket purchase, and pass this information to the location where the ticket is printed.

Using the methods and hardware described, a variety of interactive services are possible. Those skilled in the art will recognize that such interactive services may be accommodated by the preferred set top terminal 220.

g. Caller ID

Using the capability of the set top terminal and a connected modem, the set top terminal is able to perform the function of caller ID. The caller ID function of the set top terminal assists the viewer in a manner similar to the caller ID function provided by telephone companies. However, the set top terminal is able to use the television as its display means to communicate to the viewer information about incoming telephone calls. Also, the strong local processing capability of the set top terminal allows the caller ID function to be much more user friendly and convenient.

If the set top terminal senses that a viewer is using the system and watching television, then the caller ID feature would automatically be activated. When the caller ID function is active, the set top terminal software will monitor incoming telephone calls to the viewer through the modem. After the set top terminal senses that the phone is ringing, signals are received on the tip and ring lines of the telephone, the system will immediately look for incoming telephone data

identifying the telephone number from which the telephone call was initiated.

5       Upon receiving the telephone number from which the call was initiated, the preferred embodiment of the caller ID compares the telephone number with a list of telephone numbers stored in memory. The list of telephone numbers stored in memory is cross referenced to a list of names, other textual data or graphics. When the set top terminal finds a match between the telephone number and a number stored  
10       in memory, the corresponding text or graphics are displayed on the television screen. For example, "GRANDMA" and a "smiley face" graphic can be flashed across the television screen using an overlay menu.

15       In this manner the viewer may see the name (and identifying icon graphics) of the person placing the call and can decide whether to activate an automatic telephone message recording system or answer the telephone call. After generating an overlay menu, the set top terminal software awaits an IR command signifying a viewer response.  
20       With the simple depression of a button on the remote control, the viewer can instruct the set top terminal to send an activation signal to the automatic telephone message system (through a set top terminal port). Thus, the viewer can continue to watch a program and know the identity of a  
25       caller without taking his or her eyes off the television. If a dumb telephone message system is used, the viewer can simply allow the telephone to ring the requisite number of rings until the telephone answering machine normally activates and answers the call.

30       In an alternative embodiment, having no stored telephone numbers, the set top terminal may just flash the incoming telephone number on the screen using an overlay

menu. In a more sophisticated embodiment, a microphone is provided in the set top terminal or remote control unit. Using the television's speakers, a remote control, and a microphone, the viewer is able to answer the telephone using the keys of the remote control without taking his or her eyes off the television screen.

h. Digital Audio Capability

Referring to Figure 21, the digital audio feature of the invention allows a subscriber to listen to CD quality audio selections through the subscriber's stereo (not shown). This can be accomplished by running cables directly from the set top terminal 220 (which may include a Level D hardware upgrade) to the subscriber's amplifier/stereo system. Alternatively, the subscriber may listen to audio selections through the subscriber's television system.

In the preferred embodiment, the digital audio feature uses a Level D hardware upgrade as a digital radio tuner. This Level D hardware upgrade enables a subscriber to use the program delivery system's digital audio signaling capability. Digital audio transmissions require much less bandwidth than that used for the transmission of a digital video signals. Thus, hundreds of digital audio programs are delivered to each set top terminal 220 in limited segments of bandwidth.

Where digital audio programs are delivered to the set top terminal 220, the Level D upgrade (shown in Figure 13b) provides the subscriber with the means to select a given digital audio program for listening. The Level D hardware upgrade makes use of a tuner 603 that is separate from the tuner 603 used by the set top terminal 220 for video display. The digital audio signal is received at the set top terminal 220 over the CATV transmission media. The set top terminal 220, in turn, routes the digital audio signal to the

components of the Level D hardware upgrade. These components may include: a tuner 603, demodulator 606, demultiplexer 609, decryptor, decompressor 622, remote control interface and microprocessor 602.

5           The Level D hardware upgrade will use its tuner 603 to tune to the specific digital audio program selected by the subscriber and subsequently demodulate, demultiplex and decrypt the digital audio signal. Upon completion of this processing, the digital audio signal will be decompressed to  
10       produce a processed digital audio signal ready to be output to the subscriber's stereo or directly to speakers.

          The Level D hardware upgrade includes ports for the digital audio signal output, which provide the necessary connections for transmission of the signal from the Level D  
15       hardware upgrade to the subscriber's stereo. In addition, the Level D hardware upgrade include a small LED display that can show the channel number of the program selected, date and time, among other display fields.

          The Level D hardware upgrade can be physically located  
20       in a different room from that of the television and set top terminal 220. Thus, the Level D hardware upgrade will have its own remote control device (not shown), albeit with less available options and keys than the set top terminal's remote control 900 described above. This Level D hardware upgrade  
25       remote control is more limited than the set top terminal's remote control 900 since the Level D remote control will be used exclusively for digital audio program selection. This limited remote control, nevertheless, includes a small LED or LCD display that is used to display the channel number of the  
30       digital audio program selected. Alternatively, the set top terminal's remote control may be programmed for use with

the Level D hardware upgrade so that an additional remote control is not required to use the digital audio feature.

Using either remote control embodiment, the subscriber accesses the Level D hardware upgrade to select a digital audio program. The remote control sends an IR command signal to the Level D hardware upgrade, instructing the unit's microprocessor 602 to initiate the selection of a given program. The desired program is processed (i.e., tuned, demultiplexed, decrypted and decompressed) as described above and transmitted to the subscriber's stereo for listening.

The selection of a digital audio program does not necessarily require interaction with the subscriber's television. Instead, all communications required to select a digital audio program may occur between a remote control and the Level D hardware upgrade. As a result, the subscriber's television need not be turned on for the digital audio capability to operate.

Alternatively, the Level D hardware upgrade can be co-located with the set top terminal 220 and the subscriber can select a digital audio program through a menu displayed on the subscriber's television. In this embodiment, the subscriber would use the set top terminal remote control to access a digital audio program selection menu.

In an alternative embodiment, the set top terminal 220 includes all the features of the Level D upgrade and, therefore, no upgrade is necessary. Those skilled in the art will recognize other alternatives that allow digital audio reception.

Figure 21 is a major menu 1160 displaying the digital audio program choices which are available for subscribers who have paid the monthly fee. In a chart format 1162, the



major menu shows the top five, ten, and forty songs available in six different categories of music. Below the chart, the system is able to provide a text message 1164 describing the particulars of the audio program selected. Using the same logos and menu format, the system can provide a text description enticing the subscriber to pay the monthly fee and join the service. For example, one menu may allow the user to test the system with a free demonstration. Another menu allows the subscriber to request additional promotional information about the system. Such menus may be used throughout the menu system. From any of the menu screens for the digital audio feature, the subscriber may return to regular cable TV with the press of a single button.

i. VCR Control

Referring to Figure 22, the advanced system of the set top terminal 220 is used to control video tape machines and simplify recording programs using a Guide Record feature. The set top terminal 220 has a separate output 650 for a VCR. Control signals are transmitted through the VCR output of the set top terminal 220 and input to the VCR to allow the VCR to be automatically controlled by the set top terminal 220. Using the set top terminal 220, certain programs are selected by a subscriber from menus, and the VCR will be automatically activated to record the selected program.

In order to accommodate the VCR control feature, the set top terminal 220 sends instructions or control signals to the VCR. Such control signals are initiated by the set top terminal's microprocessor 602 and passed to the VCR either using a separate connection or as part of the video signals processed for display on the subscriber's television. These control signals are sent directly from the advanced set top

terminal 220 to the VCR, instructing the VCR when to begin and end taping of a particular program.

5       The microprocessor 602 coordinates the dissemination of control signals sent to the VCR, storing the content of such signals in local memory. Upon nearing the time for the program to be displayed, the microprocessor 602 activates the menu generation software to display a notification menu or screen, notifying the subscriber that the program is nearing the time for display. This reminder will also request  
10       the subscriber to check whether a tape has been inserted into the VCR itself.

      The subscriber can initiate the VCR control feature by accessing a VCR control submenu, which requests whether the subscriber wishes to record a program selected for future  
15       viewing. In this way the subscriber interactively enters such information on the menu screen or display using any of the hardware described above that accommodates subscriber interactive response capabilities.

      In the preferred embodiment, the subscriber will use a  
20       movie library in conjunction with his VCR or other video taping machinery. The movie library is a menu selectable list of available movies. In that way, a subscriber may tape movies which are shown at inconvenient start times for later viewing. By enabling the proper features of the set top terminal 220, a  
25       subscriber can have the terminal activate the television and the VCR and perform all the functions necessary to tape a movie.

      After the VCR control feature is initiated, a menu  
30       screen confirms the movie selection, start date and start time and informs the subscriber that the VCR will be automatically turned on. During this submenu, the user may return to the movie library major menu, or regular TV or cancel the movie

library order by pressing the escape button. This menu shows that the subscriber has chosen to return to regular TV. The subscriber's VCR or other video taping equipment must be connected to the set top terminal 220 for the automatic  
5 taping feature to operate.

Following a program choice, a program description submenu is placed on the television screen. In addition, from this program description submenu, the viewer may choose to record the selected program on his VCR using the guide  
10 record feature. If the guide record feature is chosen, the guide record submenu 1170 shown in Figure 22 provides the subscriber with further instructions. In order for the set top terminal 220 to perform the guide record functions and operate the VCR, control signals are sent from the set top  
15 terminal 220 to the VCR via the video connection 650 or through a separate connection between the set top terminal 220 and the VCR. The VCR is capable of interpreting these control signals from the set top terminal 220 and performing the desired function (such as, activating the record feature).  
20 In the preferred embodiment, the VCR control signals are sent with the video signal and output from the output 650, as described above. Alternatively, a separate connection between the set top terminal 220 and VCR may be used.

j. HDTV Capability

25 The set top terminal 220 and program delivery system of the preferred embodiment can easily support high definition television (HDTV). The combination of digital video, compression and no restricted bandwidth limitation per channel makes the preferred system ideal for HDTV.  
30 The greater information flow of HDTV causes no problems for the system. The menu selection system of the preferred

embodiment is a user friendly manner of presenting HDTV programming to the subscriber.

Figure 23 shows the integration of HDTV services into the menu-driven program delivery system. If the subscriber  
5 selects the major menu for HDTV 1032, the subscriber will receive either a description of the service with a suggestion to order the system, or a text note that the subscription is current and a listing of the currently available program selections in HDTV. If the subscriber has not paid to join the  
10 particular service, HDTV, the subscriber may be allowed to join one of the programs in progress for a limited time as a demo to entice the subscriber to order.

If a subscriber has paid the HDTV fees, the subscriber proceeds as in any other major menu screen. This particular  
15 major menu shows an example of how a follow-on or second screen may exist for the same menu. In this particular case, a second screen exists for the major menu HDTV 1032. The subscriber may access the second screen by selecting the last menu display block 1172 "Other HDTV Selections" in the  
20 lower part of the screen. Following this selection, the subscriber will be given a second screen of program selections. In this manner, any menu can have multiple screens with many program choices. This type of screen pagination on one menu allows the operations center 202  
25 packager to avoid categorizing program selections within that same menu. In an alternative embodiment, the options available to the subscriber may be scrolled on one menu screen with the text within the menu display blocks changing as the subscriber scrolls up or scrolls down. Many variations  
30 of this HDTV example can be used with the described system.

k. Backyard System

In an alternative configuration, in areas without cable services where subscribers use backyard satellite systems (TV RO) to receive packaged television services, the set top terminal 220 will include the appropriate hardware to allow connection to the satellite 206 reception equipment through port 656. In this configuration, the menu system within the set top terminal 220 will be programmed directly from the operations center 202. Additionally, an upstream communication mechanism must be in place at the subscriber's home (i.e. modem) to communicate information to the operations center.

The hardware components that allow the set top terminal 220 to operate in a backyard system typically will not be included within the set top terminal shell itself. Instead, any such components accommodating the set top terminal's interoperability with a backyard program delivery system will typically reside outside the subscriber's home. As a result, the set top terminal 220 will operate as described above, notwithstanding any change in program delivery transmission media.

The terms and descriptions used herein are set forth by way of illustration only and are not meant as limitations. Those skilled in the art will recognize that numerous variations are possible within the spirit and scope of the invention as defined in the following claims.

**CLAIMS**

What is claimed is:

1. An upgrade module for enhancing the functionality of a decompression box for use in a cable television program  
5 delivery system, the enhanced functionality using a control information stream that provides the decompression box with menu generation capability, the decompression box initially having the capability to produce decompressed video, the upgrade module comprising:
  - 10 an interface means for providing an electronic connection to the decompression box so that the control information stream may be received from the decompression box;
  - a means for demultiplexing the control  
15 information stream into graphics and text;
  - a means for combining the text and graphics to produce a menu generation signal; and
  - a means for transferring the menu generation  
20 signal to the interface means for output to the decompression box, whereby the menu generation signal is processed for display.
2. The upgrade module of claim 1 further comprising a graphics decompressor for decompressing the graphics to  
25 produce decompressed graphics that may be used to generate menus.
3. The upgrade module of claim 1 for further providing the decompression box with a program catalogue that  
30 provides the subscriber with program schedules and descriptions, the decompression box providing the upgrade module with video signals, wherein the interface means

comprises a means for receiving the video signals from the decompression box and wherein the combining means comprises:

- 5                   a means for interpreting the text and graphics;
- a means for integrating the received video signals, the interpreted text and the interpreted graphics to produce the menu generation signal, whereby the menu generation signal carries data required for display of the program catalogue; and
- 10                  a means for sending the menu generation signal to the transfer means, whereby the menu generation signal is output to the decompression box for display of the program catalogue.

- 15       4.    The upgrade module of claim 1 for further enabling the decompression box to use promotional menus that provide the subscriber with promotional videos, text and graphics showing future events available for menu driven program selection, the decompression box providing the upgrade
- 20       module with video signals, wherein the interface means comprises a means for receiving the video signals from the decompression box, and wherein the combining means comprises:

- a means for interpreting the text and graphics;
- 25                  a means for integrating the received video signals, the interpreted text and the interpreted graphics to produce the menu generation signal, whereby the menu generation signal carries data required for display of the promotional menus; and
- 30                  a means for sending the menu generation signal to the transfer means, whereby the menu generation signal is output to the simple decompression box for

display of the promotional menus and the promotional videos, text and graphics.

- 5        5.     The upgrade module of claim 1, wherein the menu generation capability makes use of graphics and text stored locally within the upgrade module, and wherein the upgrade module further comprises a memory means for storing the graphics and text for use with the menu generation signal, so that the menus can be generated.
- 10       6.     The upgrade module of claim 1, wherein the interface means comprises at least one cable connector adapted for use with an upgrade port on the decompression box.
- 15       7.     The upgrade module of claim 1, wherein the decompression box has an expansion card slot, and wherein the interface means comprises at least one card connector adapted for use with the expansion card slot in the decompression box.
- 20       8.     The upgrade module of claim 1 for further providing the decompression box with a telephone caller identification message, the decompression box having a port adapted to receive telephone signals from a telephone line, wherein the
- 25       upgrade module further comprises:  
         a connection means for providing an electronic connection to the decompression box for receiving the telephone signals;  
         a means for processing the telephone signals to produce text messages and graphics icons; and
- 30       a means for sending the text messages and graphics icons to the combining means to produce the



menu generation signal, whereby the text messages and graphics icons are used to form the menu generation signal that is transferred to the decompression box for display of the caller identification message.

5

9. The upgrade module of claim 1 for further providing the simple decompression box with video cassette recorder control capability that uses recording menus presenting selection options to a subscriber and video cassette recorder control signals sent to the decompression box, the video cassette recorder control signals corresponding to the selection options chosen by the subscriber, wherein the menu generation card further comprises:

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- a means for generating the recording menus;
- a means for interpreting the selection options chosen by the subscriber and received from the set top converter through the interface means;
- a means for generating the video cassette recorder control signals based on the interpreted selection options chosen by the subscriber; and
- a means for transmitting the video cassette recorder control signals to the decompression box for instructing the video cassette recorder in recording of programs.

10. A hardware upgrade for enhancing the functionality of a set top converter in a cable television program delivery system, each set top converter having menu generation capability and a subscriber interface adapted to receive subscriber inputs, the hardware upgrade using interactive programming instructions to process interactive subscriber

inputs to produce processed interactive subscriber inputs,  
the hardware upgrade comprising:

5           an interface means for providing an electrical  
connection to the set top converter, whereby the  
interactive subscriber inputs are transferred from the  
set top converter for processing and the processed  
interactive subscriber inputs are passed to the set top  
converter for display;

10           a means for storing the interactive programming  
instructions;

          a means for accessing the stored interactive  
programming instructions;

15           a microprocessing means for processing the  
interactive subscriber inputs to produce the processed  
interactive subscriber inputs based on the stored  
interactive programming instructions.

11. The hardware upgrade of claim 10, wherein the  
interface means comprises:

20           a means for receiving the subscriber inputs from  
the set top converter, wherein the received subscriber  
inputs include textual information that is used to  
produce the processed subscriber inputs; and

25           a means for transferring the processed subscriber  
inputs to the set top converter for display.

12. The hardware upgrade of claim 10 for use with on-line  
databases and interactive services outside of the cable  
television program delivery system, wherein the hardware  
30           upgrade further comprises a telephone modem adapted to  
provide communications capability with the on-line databases  
and the interactive services.

13. The hardware upgrade of claim 10 that uses digital data, wherein the hardware upgrade further comprises:

5           a high volume memory means capable of storing the digital data to produce stored digital data; and  
          a means for linking the high volume memory means to the microprocessing means, wherein the stored digital data is transferred to and received from the microprocessing means.

10

14. The hardware upgrade of claim 10, wherein the set top converter has an expansion card slot, and wherein the interface means comprises at least one card connector adapted for use with the expansion card slot in the set top converter.

15

15. A hardware upgrade for enhancing the functionality of a set top converter and television display in a cable television program delivery system, each set top converter having a subscriber interface adapted to receive subscriber inputs and to display menus, the enhanced functionality allowing reception of digital audio programs, the hardware upgrade comprising:

20

          a subscriber interface means for subscriber  
25       selection of any one of the digital audio programs using one or more of the menus displayed with the menu generation capability;

25

          an interface means for providing an electrical connection to the set top converter, wherein the subscriber selections are passed to the set top converter for display and wherein the digital audio programs received;

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a means for processing digital audio programs;  
and

5 a means for enabling one of the digital audio  
programs for listening based on the subscriber  
selections.

16. The hardware upgrade of claim 15 for use with a  
frequency carrying a digital audio signal, wherein the  
processing means comprises:

10 a means for tuning to the frequency carrying the  
digital audio signal that corresponds to one of the  
digital audio programs;  
a means for demodulating the digital audio signal;  
a means for extracting one of the digital audio  
15 programs from the digital audio signal; and  
a means for decompressing the extracted digital  
audio program for output to the set top converter,  
whereby the digital audio output occurs over the  
interface means.

20

17. An upgradeable set top converter for use in a cable  
television program delivery system, the set top converter  
initially having video decompression capability and an  
expansion card slot adapted to receive a menu generation  
25 card, the set top converter upgradeable for enhanced  
functionality that provides the set top converter with menu  
generation capability using a control information stream  
received from a remote location, the upgradeable set top  
converter comprising:

30 an interface means for providing an electronic  
connection to the set top converter, whereby the

control information stream is received from the set top converter through the interface means;

a means, connected to the interface means, for demultiplexing the control information stream into graphics and text, whereby the control information stream is passed to the demultiplexing means from the set top converter through the interface means; and

an expansion card interface means for receiving the menu generation card, whereby the menu generation card upgrades the set top converter for menu generation capability.

18. The upgradeable set top converter of claim 17 further comprising a graphics decompressor for decompressing the graphics to produce decompressed graphics that may be used to generate menus.

19. An upgraded set top converter for use in a cable television program delivery system, the set top converter initially having video decompression capability and an expansion card slot, the set top converter upgraded for enhanced functionality that provides the set top converter with menu generation capability using a control information stream received from a remote location, the upgraded set top converter comprising:

an interface means for providing an electronic connection to the set top converter;

a means for demultiplexing the control information stream into more than one program signal component, including graphics and text, whereby the control information stream is passed to the

demultiplexing means from the set top converter through the interface means; and

an expansion card interface means; and

5 a menu generation card, electronically connected to the expansion card interface means, comprising a means for combining the text, graphics and video signals to produce a menu generation signal, whereby the menu generation signal is output through the interface means to the set top converter to be  
10 processed for display.

20. The upgraded set top converter of claim 19 further comprising a graphics decompressor for decompressing the graphics to produce decompressed graphics that may be used  
15 to generate menus.

21. The upgraded set top converter of claim 19 with the enhanced functionality further providing the set top converter with a program catalogue that provides the  
20 subscriber with program schedules and descriptions corresponding to video signals, wherein the interface means comprises a means for receiving the video signals, and wherein the combining means comprises:

a means for interpreting the text and graphics;

25 a means for integrating the video signals, the interpreted text and the interpreted decompressed graphics to produce the menu generation signal, whereby the menu generation signal carries data required for display of the program catalogue; and

30 a means for sending the menu generation signal to the transfer means, whereby the menu generation

signal is output to the set top converter for display of the program catalogue.

22. The upgraded set top converter of claim 19 for further  
5 enabling the set top converter to use promotional menus that  
provide the subscriber with promotional video signals, text  
and graphics showing future events available for menu driven  
program selection, wherein the interface means comprises a  
means for receiving the video signals, and wherein the  
10 combining means comprises:

a means for interpreting the text and graphics;  
a means for integrating the promotional video  
signals, the interpreted text and the interpreted  
graphics to produce the menu generation signal,  
15 whereby the menu generation signal carries data  
required for display of the promotional menus; and  
a means for sending the menu generation signal  
to the transfer means, whereby the menu generation  
signal is output to the set top converter for display of  
20 the promotional menus.

23. The upgraded set top converter of claim 19 for further  
providing the set top converter with a telephone caller  
identification message, the set top converter having a port  
25 adapted to receive telephone signals from a telephone line,  
wherein the menu generation card further comprises:

a connection means for providing the electronic  
connection to the set top converter, whereby the  
telephone signals are received from the set top  
30 converter; and

a means for processing the telephone signals to  
produce text messages and graphics icons and for

5            sending the text messages and graphics icons to the combining means to produce the menu generation signal, whereby the text messages and graphics icons are used to form the menu generation signal that is transferred to the set top converter for display of the caller identification message.

10           24. The upgraded set top converter of claim 19 for further providing the set top converter with video cassette recorder control capability that uses recording menus presenting selection options to a subscriber and video cassette recorder control signals sent to the set top converter, the video cassette recorder control signals corresponding to the selection options chosen by the subscriber, wherein the menu generation card further comprises:

15                    a means for generating the recording menus;

                  a means for interpreting the selection options chosen by the subscriber and received from the set top converter through the interface means;

20                    a means for generating the video cassette recorder control signals based on the interpreted selection options chosen by the subscriber; and

                  a means for transmitting the video cassette recorder control signals to the set top converter for

25           instructing the video cassette recorder in recording of programs.

30           25. An advanced set top terminal with digital decompression and menu generation capabilities for use with a cable television program delivery system having digitally compressed program signals and a control information stream carrying menu content information, each set top



terminal stores menu content information used to generate menu displays, the advanced set top terminal comprising:

a means for storing the menu content information;

5 a means for receiving the digitally compressed program signals and the control information stream;

a first signal processing means for processing the control information stream to produce processed control information, whereby the processed control information is used to update the stored menu content information to produce updated menu content information;

10

a means for generating the menu displays using the updated menu content information, whereby the menu displays produce subscriber options for selection of other menus and television programs;

15

a means for selecting the other menus and the television programs;

a means for tuning to one of the digitally compressed television programs signals to produce a tuned television program signal; and

20

a second signal processing means for processing the tuned television program signal to produce a video signal and audio signal for television display and listening.

25

26. The advanced set top terminal of claim 25, wherein the second signal processing means comprises:

a means for demodulating the tuned television program signal to produce a demodulated program signal;

30

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a means for demultiplexing the demodulated program signal to produce video signal components and audio signal components;

5 a video decompressing means for decompressing the video signal components to produce decompressed video signal components;

an audio decompressing means for decompressing the audio signal components to produce decompressed audio signal components;

10 a means for combining the decompressed video signal components with the stored menu content information for television display of the video signal; and

15 a means for producing the audio signal from the decompressed audio signal components.

27. The advanced set top terminal of claim 26 that has a picture-on-picture capability using multiple tuners, wherein the tuning means comprises more than one tuner so that the multiple tuners can produce multiple television program signals which will be overlayed over one another.

28. The advanced set top terminal of claim 26 having a program catalogue service that provides the subscriber with program schedules and descriptions, the program schedules and descriptions created from text and graphics, the text and graphics and the decompressed video derived from the control information stream, wherein the advanced set top terminal further comprises:

30 a means for interpreting the text and graphics;

a means for integrating the interpreted text, the interpreted graphics and the video signal to produce a

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menu generation signal, whereby the menu generation signal carries data required for display of the program catalogue; and

5 a means for outputting the menu generation signal for display.

29. The advanced set top terminal of claim 26 having a promotional menu display capability that provides subscribers with promotional videos, text and graphics showing future events available for menu driven program selection, wherein text and graphics are derived from the control information stream, and wherein the advanced set top terminal further comprises:

15 a means for interpreting the text and graphics;  
a means for integrating the interpreted text, the interpreted graphics and the decompressed video to produce a menu generation signal, whereby the menu generation signal carries data required for display of the promotional videos; and  
20 a means for outputting the menu generation signal for display.

30. The advanced set top terminal of claim 25 capable of operating with interactive services conducted from a cable headend or other remote location, the interactive services requiring entry of interactive subscriber inputs and use of interactive programming instructions, wherein the selection means comprises:

30 a subscriber interface means for entry of the interactive subscriber inputs;  
a means for storing the interactive programming instructions;

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a means for accessing the stored interactive programming instructions;

a microprocessing means for executing the stored interactive programming instructions to produce  
5 interactive signals; and

an upstream data transmission means for transmitting the produced interactive signals to the cable headend.

10 31. The advanced set top terminal of claim 26 having a caller identification function capable of displaying a caller identification message using a menu generation signal, wherein the advanced set top terminal further comprises:

a means for receiving telephone signals;

15 a means for processing the telephone signals to produce text messages and graphics icons using the menu content information;

a means for combining the text messages and graphics icons to produce the menu generation signal carrying the caller identification message for television  
20 display; and

a means for preparing the menu generation signal for television display.

25 32. The advanced set top terminal of claim 25 capable of processing high definition television signals, wherein the second signal processing means comprises:

a means for interpreting the high definition television signals; and

30 a means for preparing the interpreted high definition television signals for television display.

33. The advanced set top terminal of claim 25 capable of receiving television program signals through a backyard system having backyard digital signal processing equipment, wherein the advanced set top terminal further comprises an interface means for electrically connecting the backyard digital satellite processing equipment to the first signal processing means.

34. A remote control unit for use with a set top terminal, the set top terminal capable of receiving a plurality of digitally compressed television signals and generating a plurality of menus corresponding to the digitally compressed signals, each menu corresponding to a group of related programs or a single program, the remote control unit comprising:

means, within the remote control unit, for communicating with the set-top terminal to allow selection of a desired program by a user from the plurality of menus; and,

a plurality of switches, coupled to the means for communicating, the plurality of switches including menu select switches and cursor movement switches, the cursor movement switches being capable of causing a cursor to move on a menu;

the menu select switches being capable of selecting a desired menu from the plurality of menus, the menu switches having icons representing the groups of related television signals;

the cursor movement switches located substantially at the center of mass of the remote control unit, and each cursor movement switch having an angled surface;

5                   whereby a user's thumb may easily access  
and depress a cursor movement switch or menu  
select switch and distinguish the cursor  
movement switches and menu select switches  
from the remainder of the plurality of switches  
without looking at the remote control unit.

10           35. The remote control unit of claim 34 wherein the  
plurality of switches includes two groups of switches, a  
standard group including the volume control and channel  
select switches, and a special group including the cursor  
movement switches and menu select switches, whereby the  
two groups of switches are physically separated from each  
other on the remote control unit by a line at or above the  
15           center of mass of the remote control unit.

36. The remote control unit of claim 34 further comprising  
a joystick for cursor movement.

20           37. The remote control unit of claim 34 further comprising  
a ball for cursor movement.

38. The remote control unit of claim 34 further comprising  
a rolling-depressible button for cursor movement.

25           39. An interface system with program instructions that uses  
button depression signals for subscriber entries for a  
subscriber to interface with a video and audio programming  
delivery system which uses digitally compressed signals, for  
30           selecting programs using a cursor on menus or menu buttons,  
comprising:

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a portable remote control unit for accepting subscriber entries comprising:

a plurality of buttons for creating button depressions signals comprising:

5 cursor movement buttons for directional movement of the cursor; and menu buttons for choosing menus; and

10 a means for communicating button depression signals;

a set top terminal unit for selecting programs comprising:

a means for receiving the digitally compressed signal;

15 a means for decompressing the digitally compressed signal into a decompressed signal;

a means for generating menus from the decompressed signals;

20 a means for receiving the communicated button depression signals;

a processor means, connected to the receiving means, for executing the program instructions comprising:

25 a means for effecting the execution order of program instructions using the button depression signals; and

a means for sequencing through the generated menus.

30 40. A method for enhancing the functionality of a decompression box for use in a cable television program delivery system, the enhanced functionality using a control

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information stream that provides the decompression box with menu generation capability, the decompression box initially having the capability to produce decompressed video, the upgrade module comprising:

5           providing an electronic connection to the decompression box so that the control information stream may be received from the decompression box; demultiplexing the control information stream into graphics and text;

10           combining the text and graphics to produce a menu generation signal; and  
            transferring the menu generation signal to the decompression box, whereby the menu generation signal is processed for display.

15

41. A method for enhancing the functionality of a set top converter, each set top converter having a subscriber interface adapted to receive subscriber inputs and menu generation capability for operation in a cable television program delivery system, the enhanced functionality using  
20           interactive programming instructions to process interactive subscriber inputs, the method comprising the steps of:

            providing an electrical connection to the set top converter, whereby the interactive subscriber inputs  
25           are transferred from the set top converter for processing and the processed interactive subscriber inputs are passed to the set top converter for display;  
            storing the interactive programming instructions;  
            accessing the stored interactive programming  
30           instructions;  
            executing the interactive programming instructions; and



5 electrically processing the interactive subscriber inputs to produce the processed interactive subscriber inputs, wherein the interactive subscriber inputs are electrically processed according to the executed interactive programming instructions.

10 42. A method for enhancing the functionality of a set top converter, each set top converter having a subscriber interface adapted to receive subscriber inputs and menu generation capability for operation in a cable television program delivery system, the enhanced functionality allowing reception of digital audio programs, the method comprising the steps of:

15 providing an electrical connection to the set top converter, wherein the subscriber inputs are passed to the set top converter for display and wherein the digital audio programs received;

processing the digital audio programs;  
20 selecting any one of the processed digital audio programs using one or more of the menus displayed with the menu generation capability; and  
enabling the subscriber inputs to produce one of the digital audio programs for listening.

25 43. A method for upgrading a set top converter for use in a cable television program delivery system, the set top converter having video decompression capability and an expansion card slot adapted to receive a menu generation card, the set top converter upgradeable for enhanced  
30 functionality that provides the set top converter with menu generation capability using a control information stream

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received from a remote location, the method comprising the steps of:

providing an electronic connection to the set top converter;

5 demultiplexing the control information stream into graphics and text, whereby the control information stream is received from the set top converter;

graphically decompressing the graphics to produce decompressed graphics that may be used to generate menus; and

10 connecting the menu generation card to the set top converter; and

using the menu generation card to combine the text and decompressed graphics to produce a menu generation signal, whereby the menu generation signal is output to the set top converter to be processed for display.

15

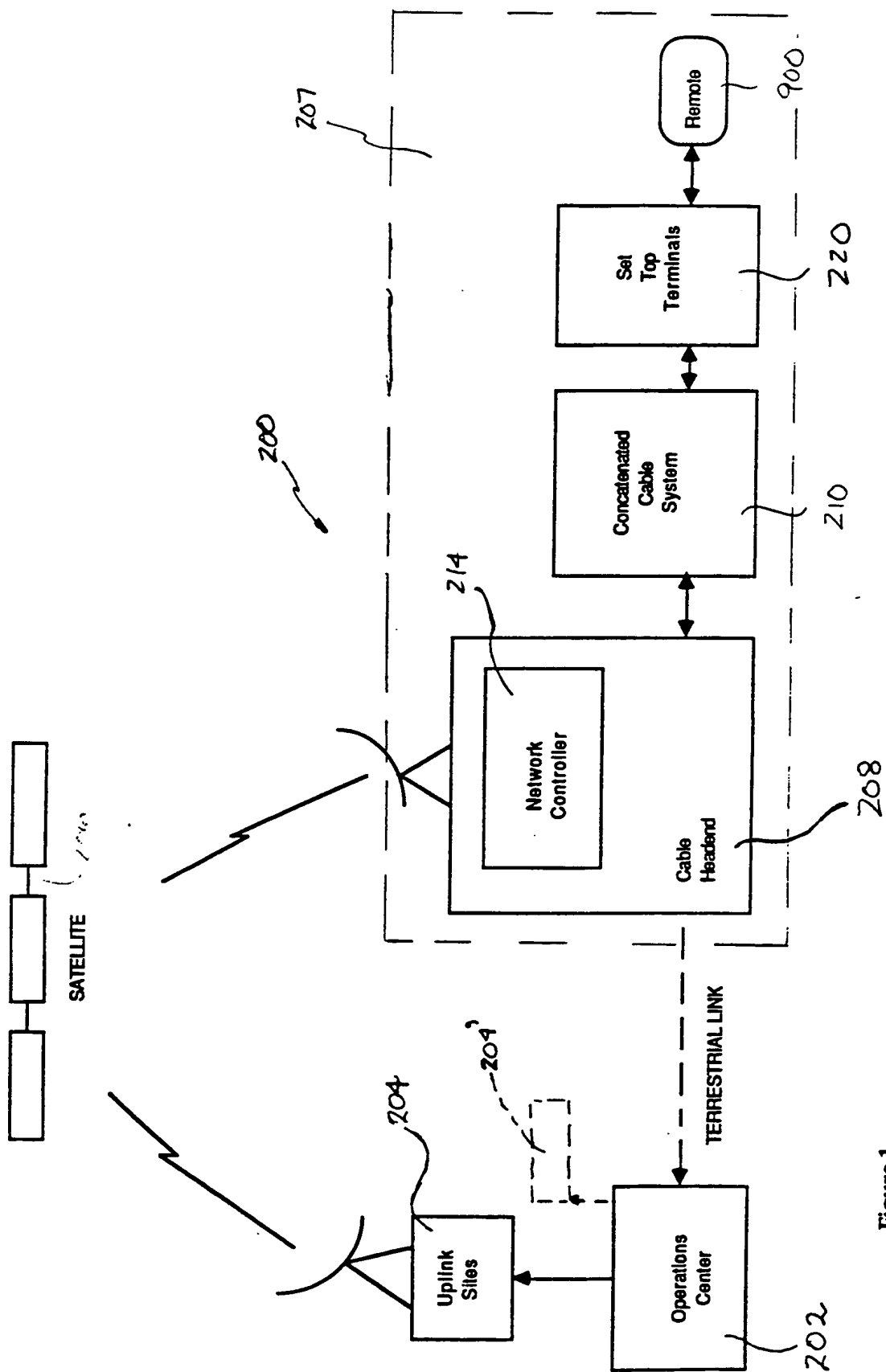


Figure 1

Figure 2

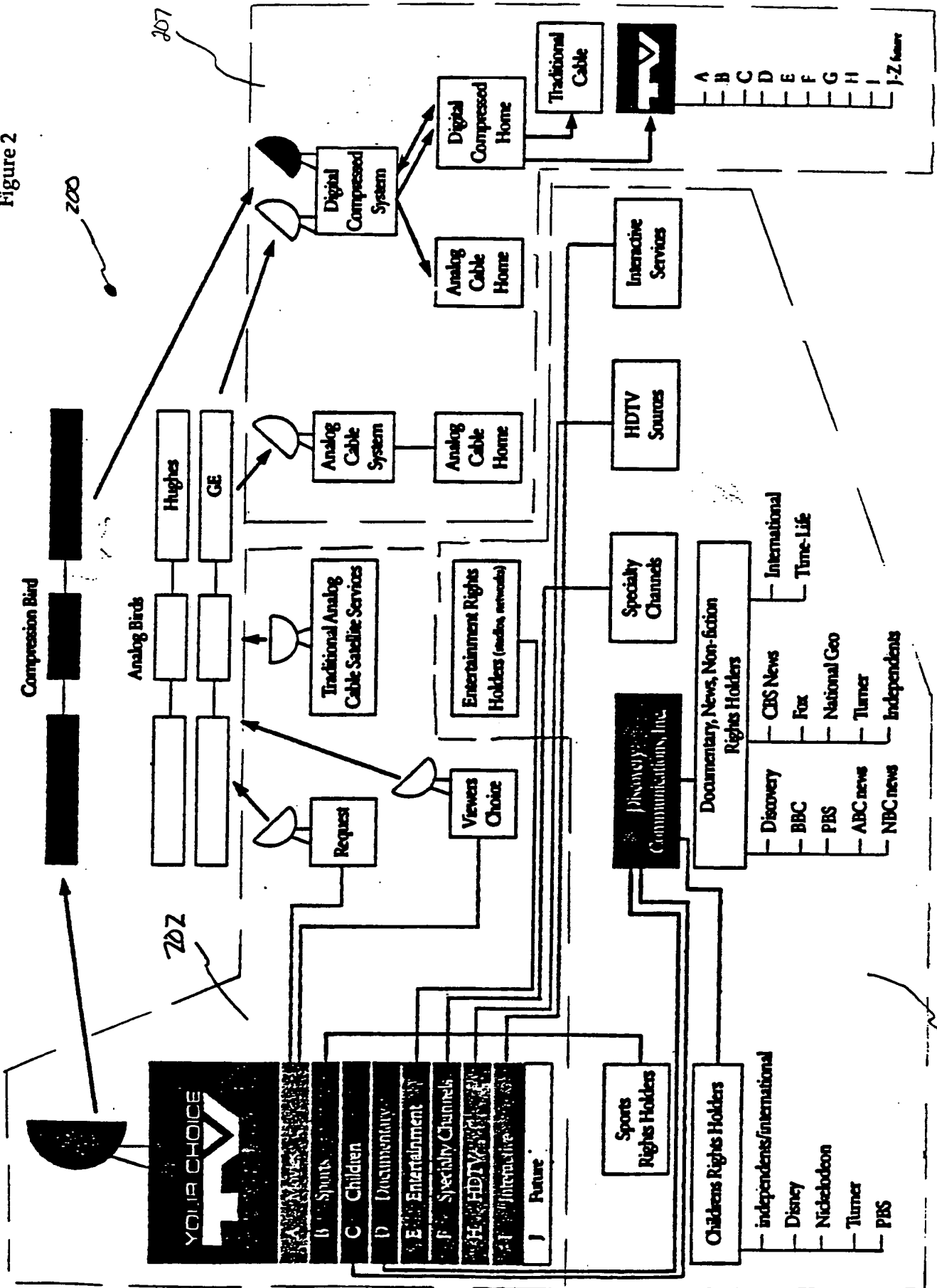
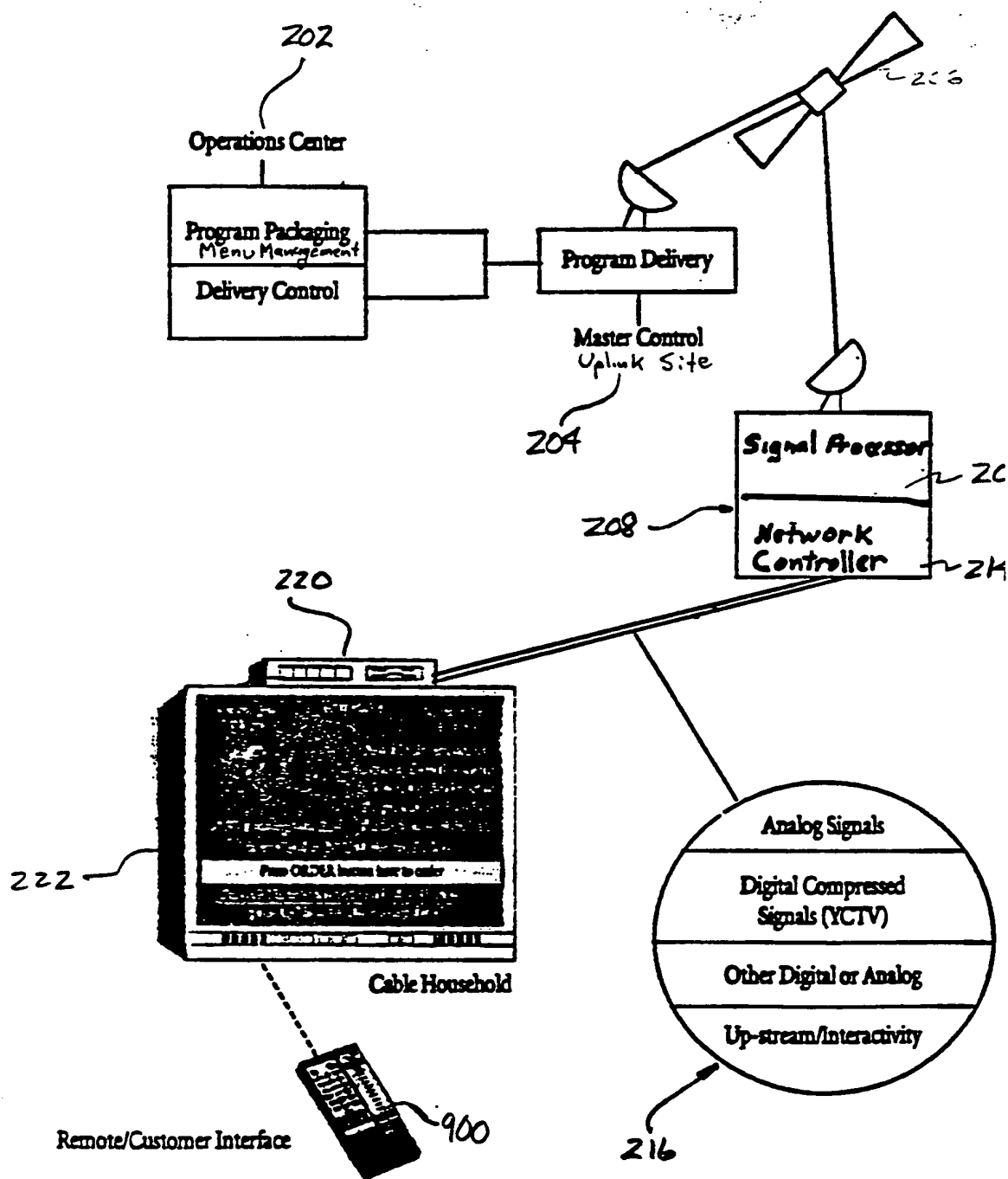


Figure 3



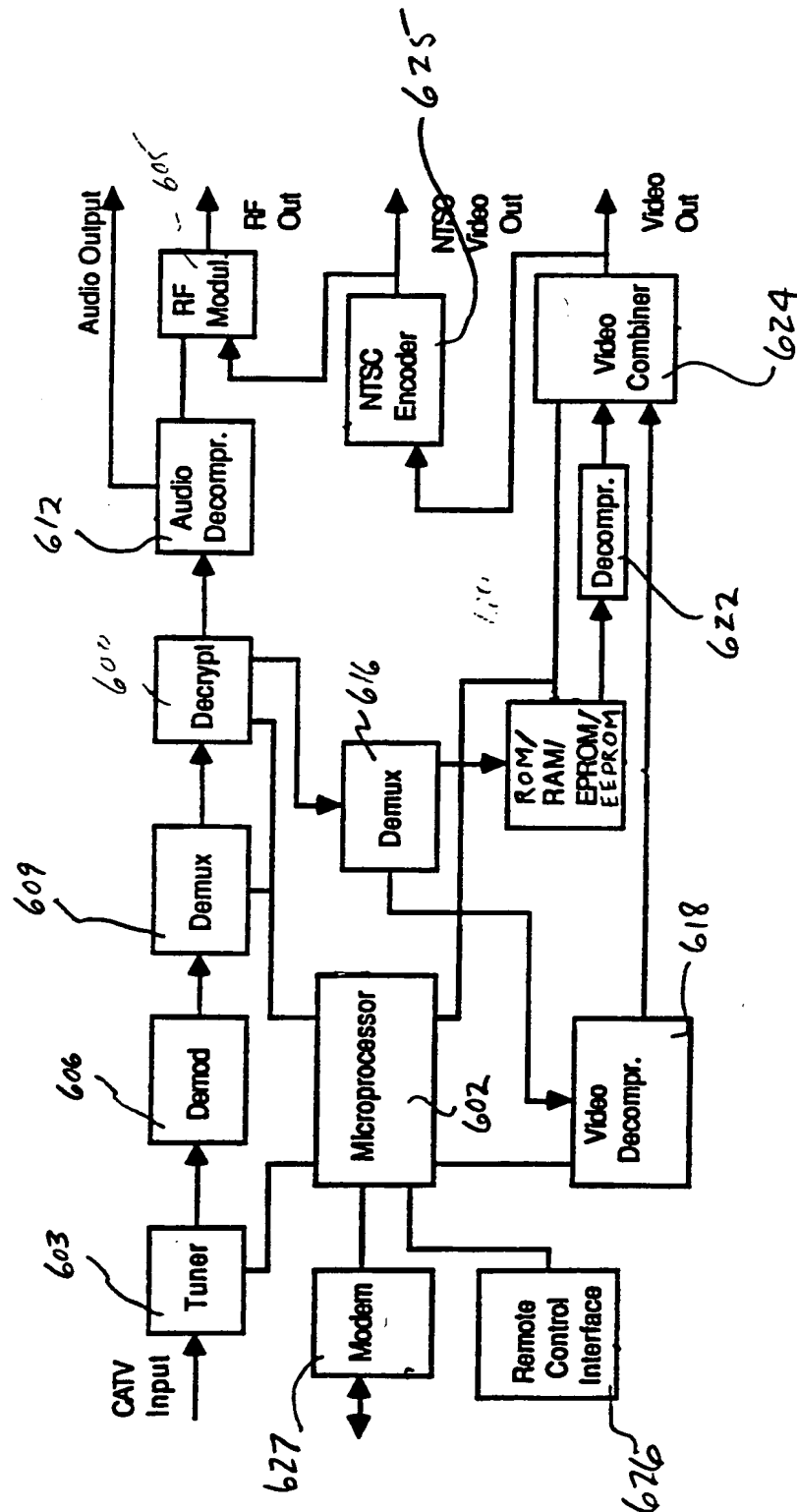
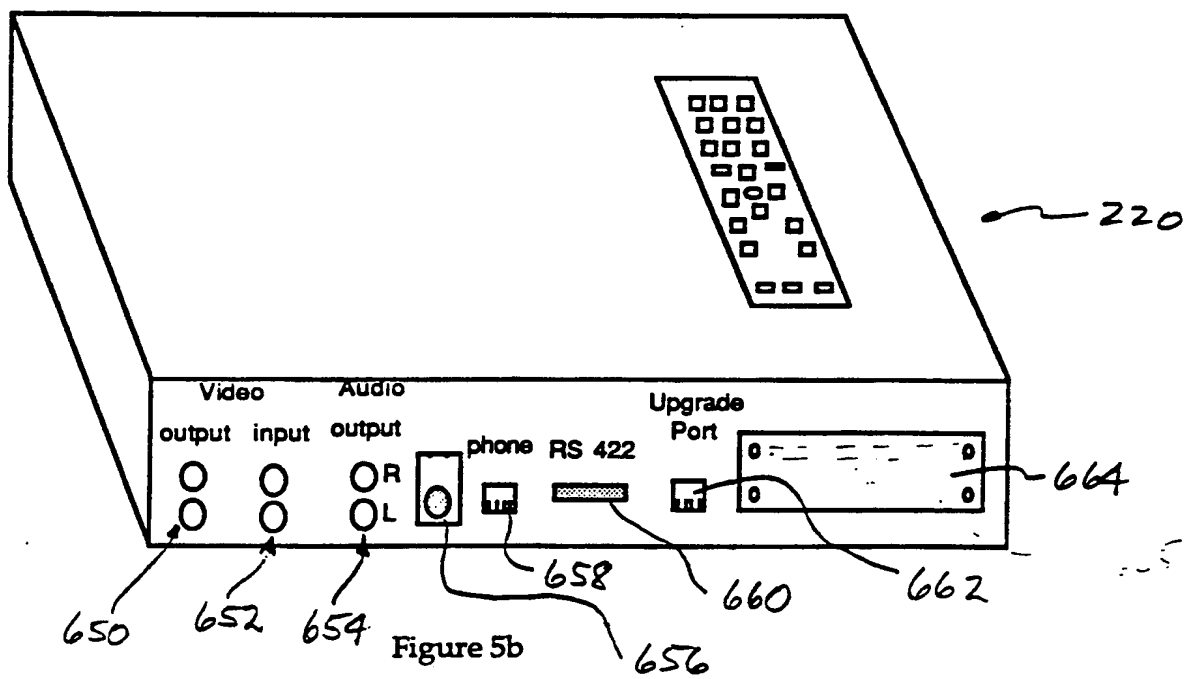
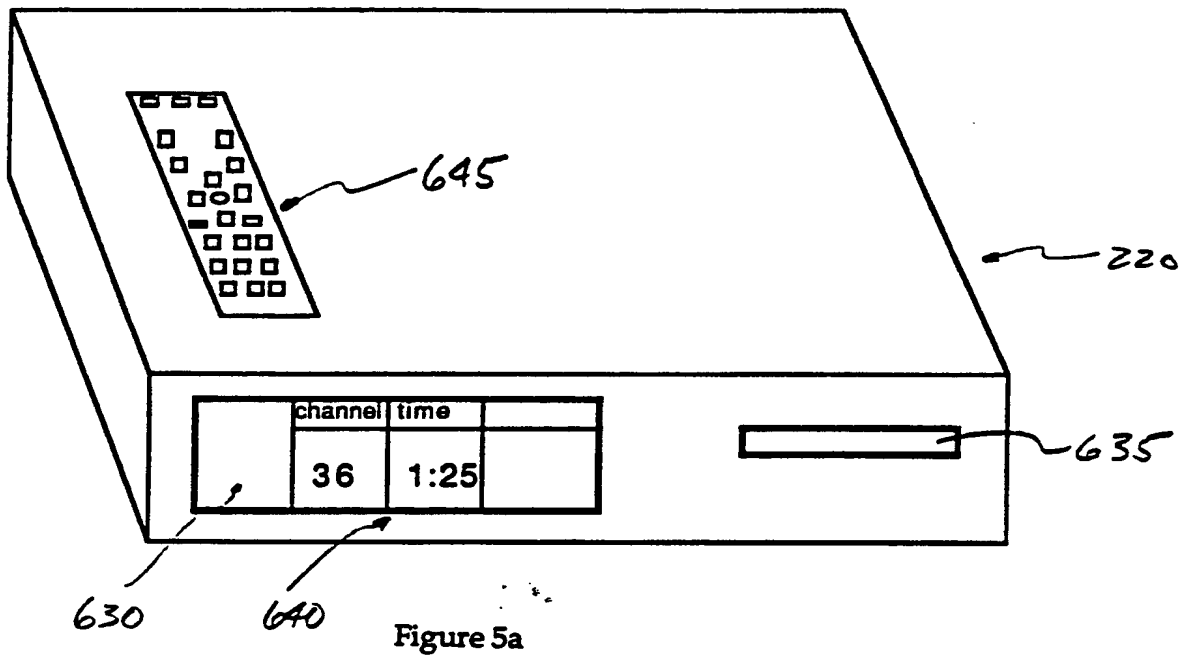


Figure 4

220



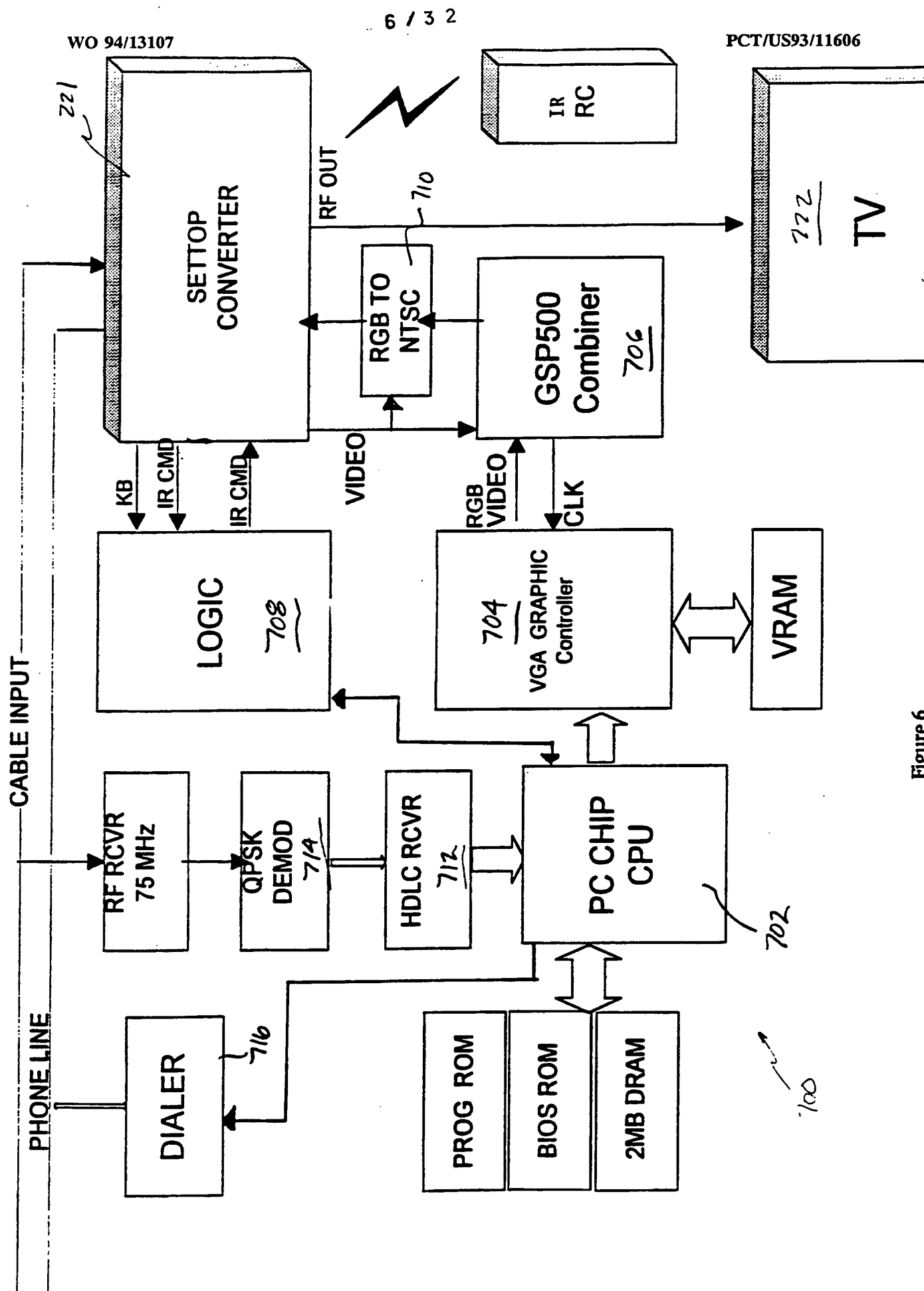


Figure 6



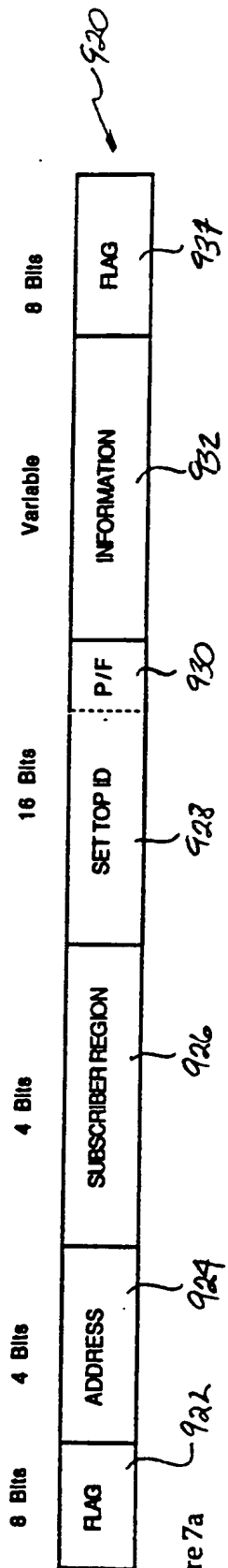


Figure 7a

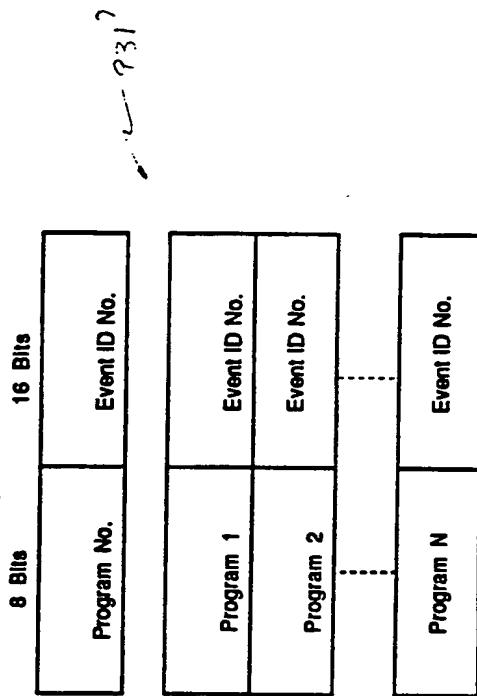
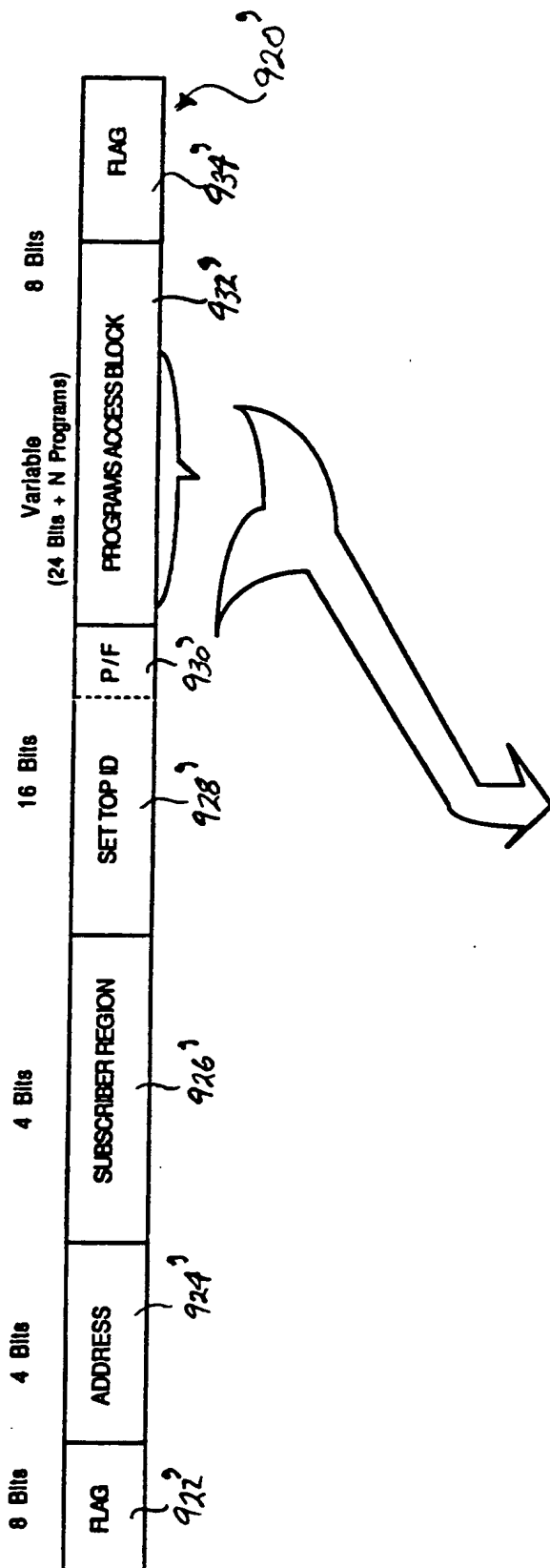
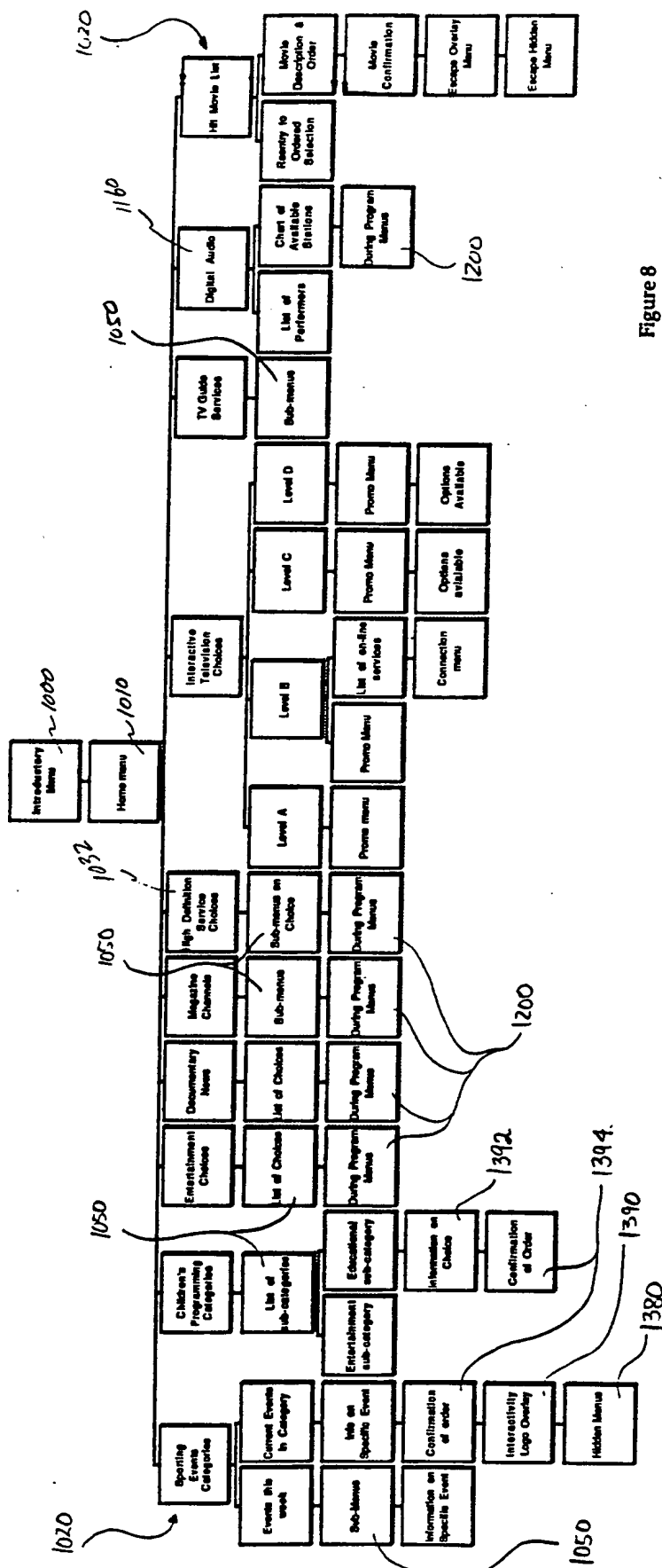


Figure 7b



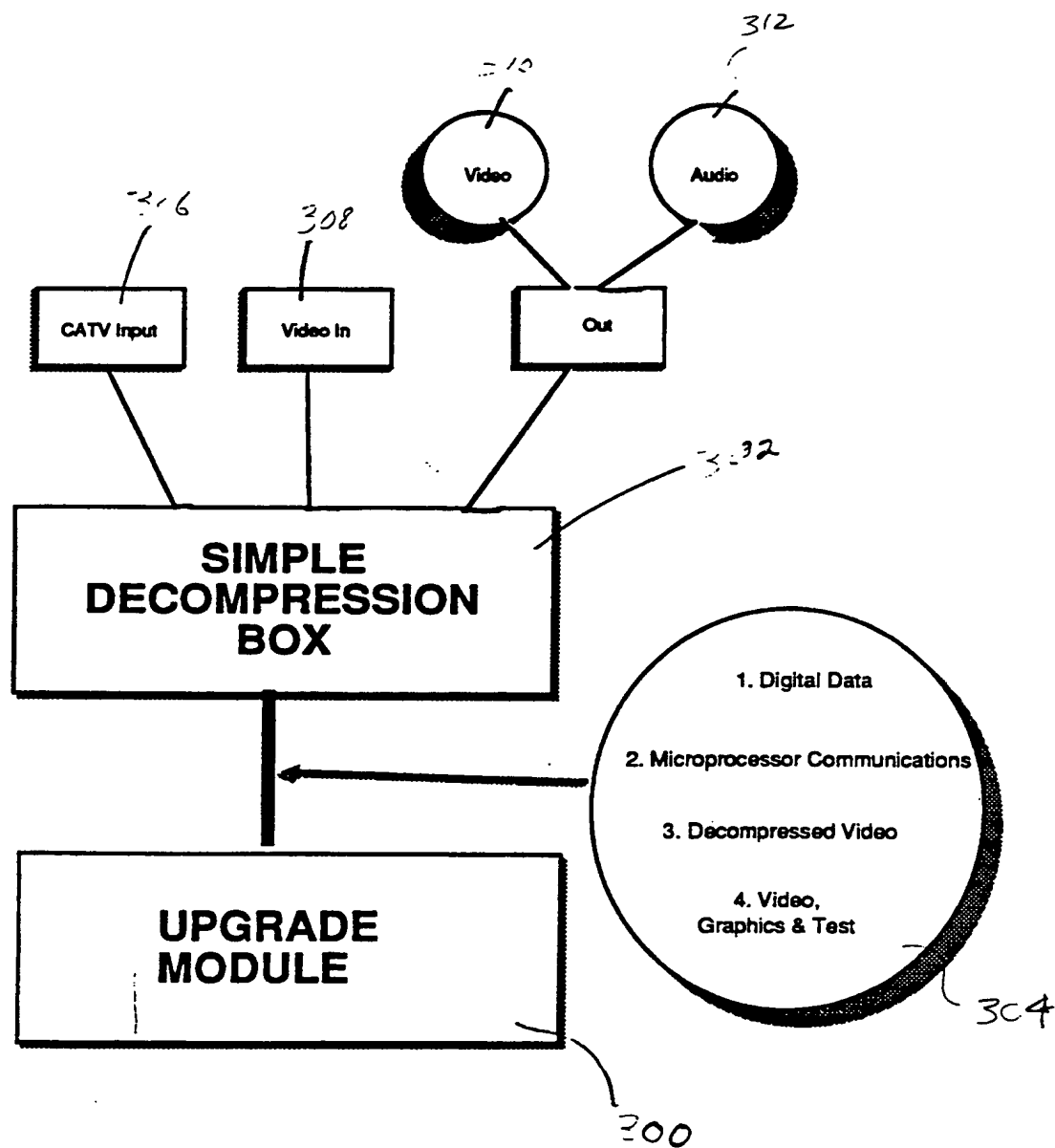


FIG. 9a

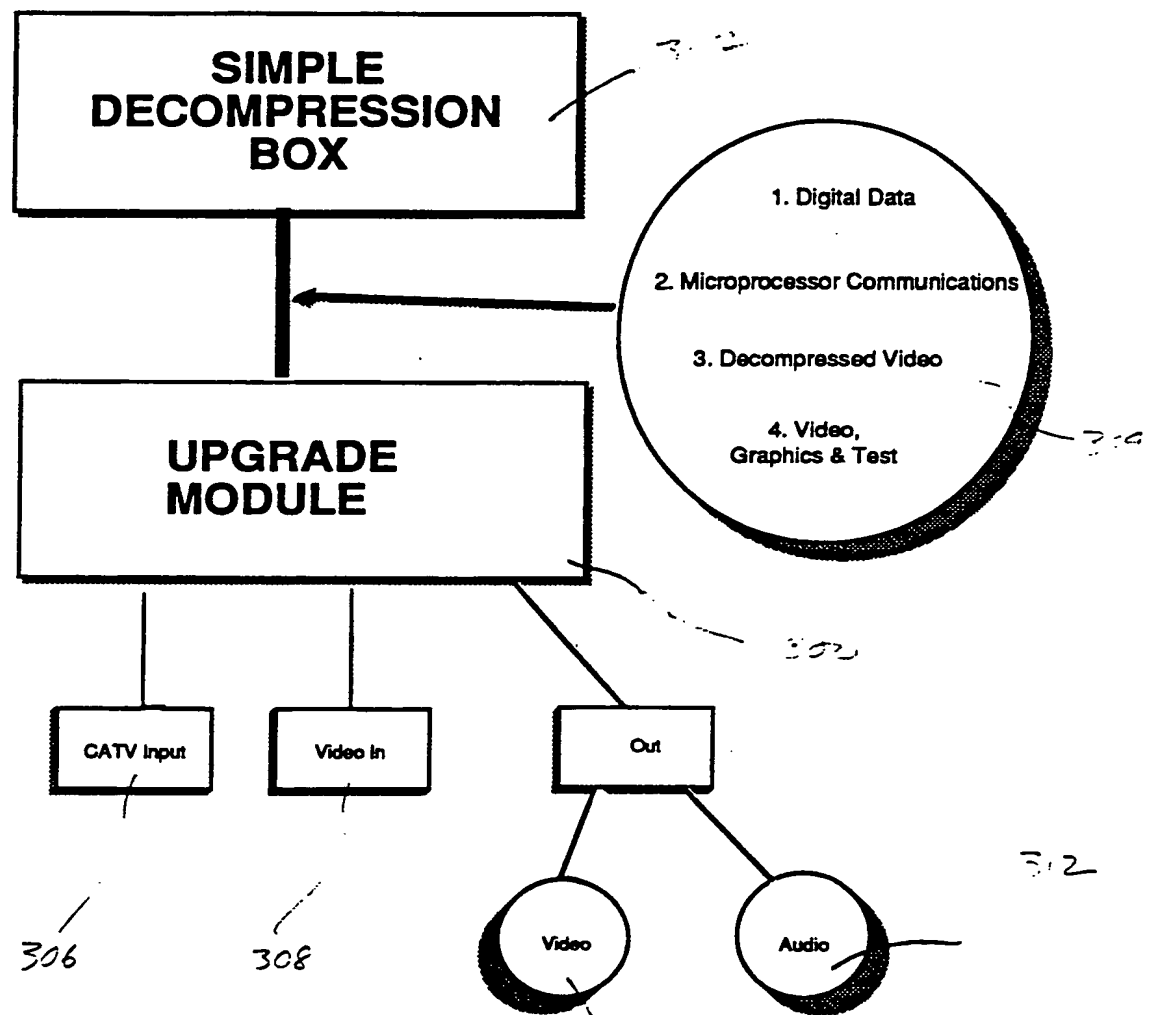


FIG. 9b

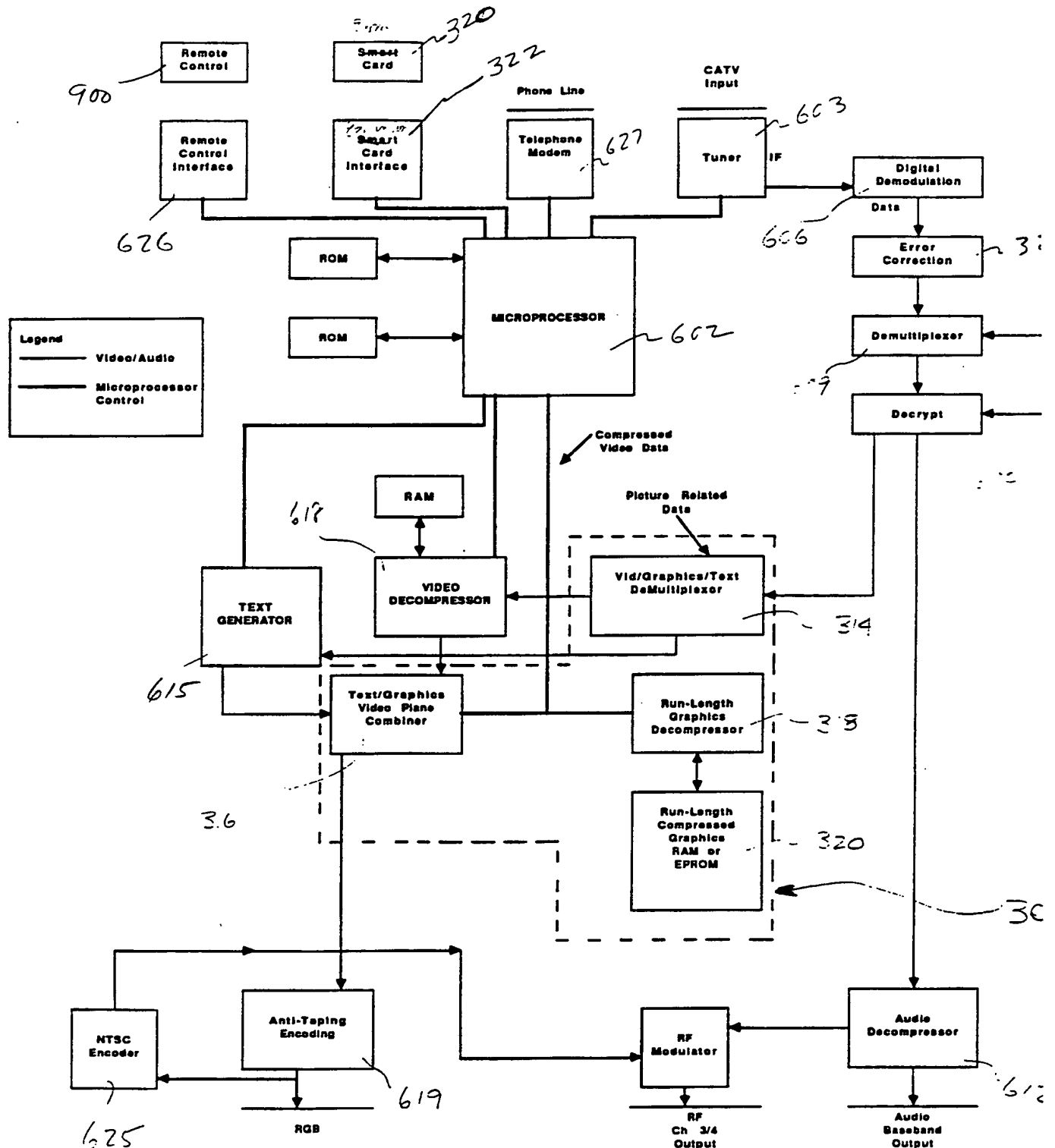
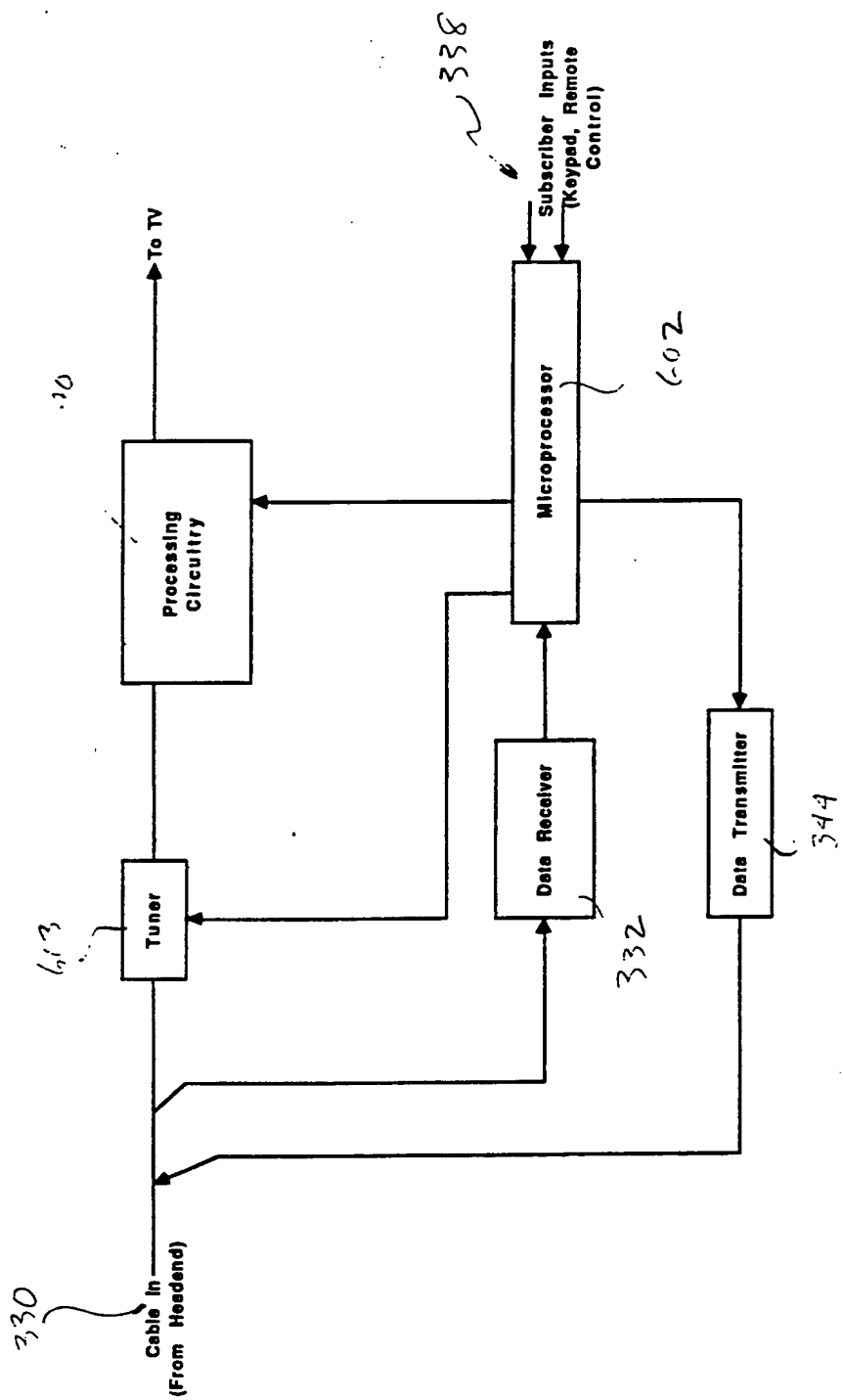


FIG. 10



Set Top Terminal Upstream Data Transmission Hardware

FIG. 11

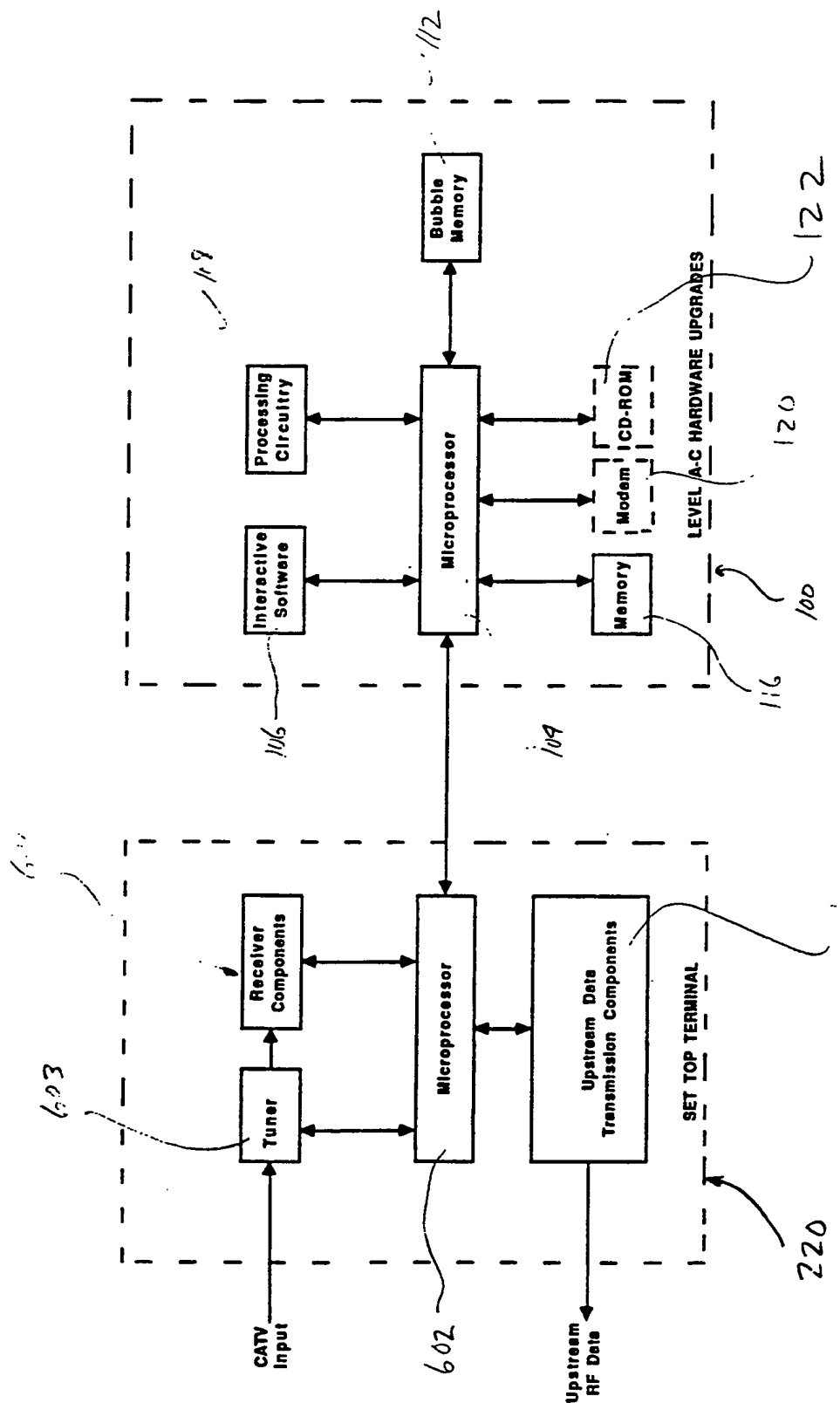


FIG. 12a

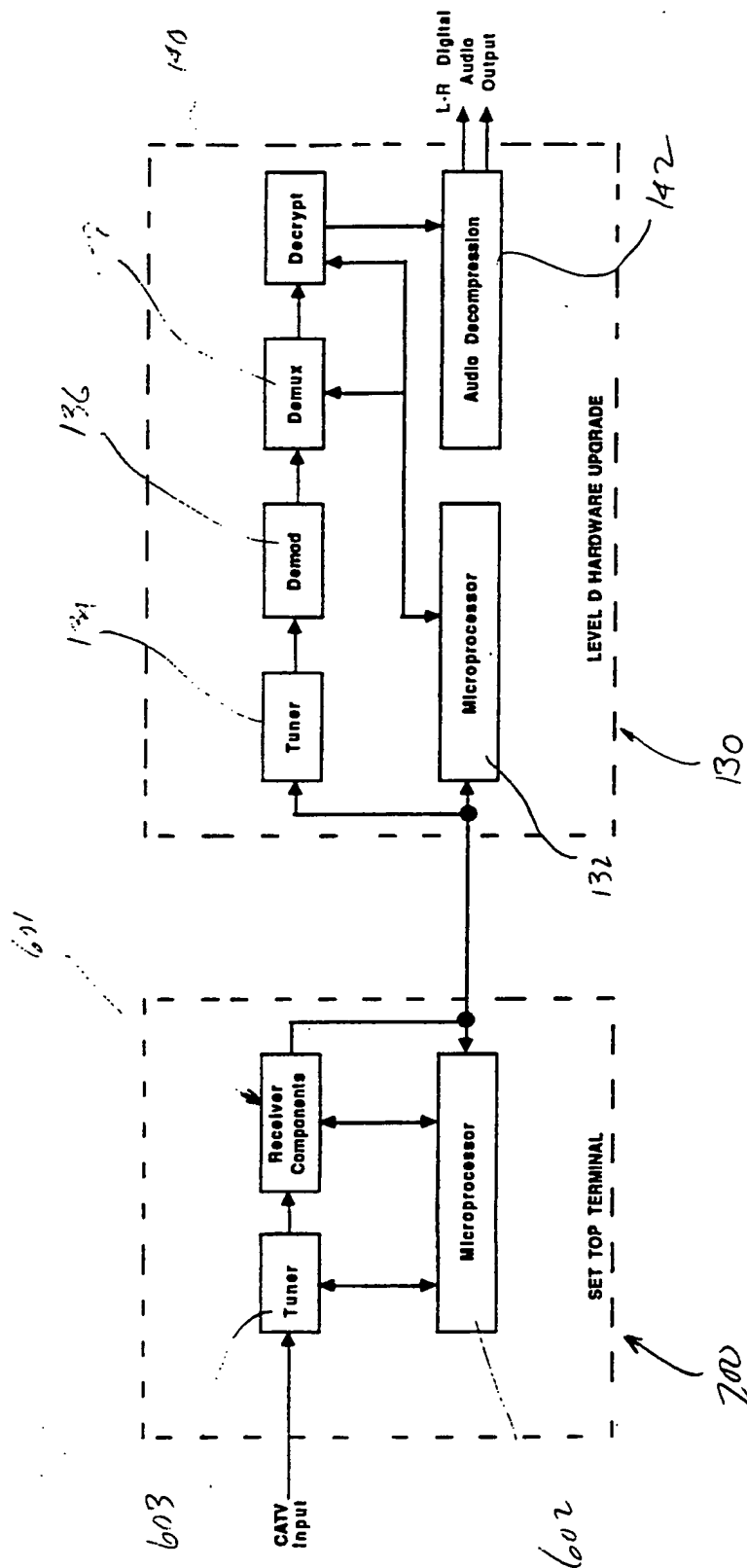


FIG. 12b



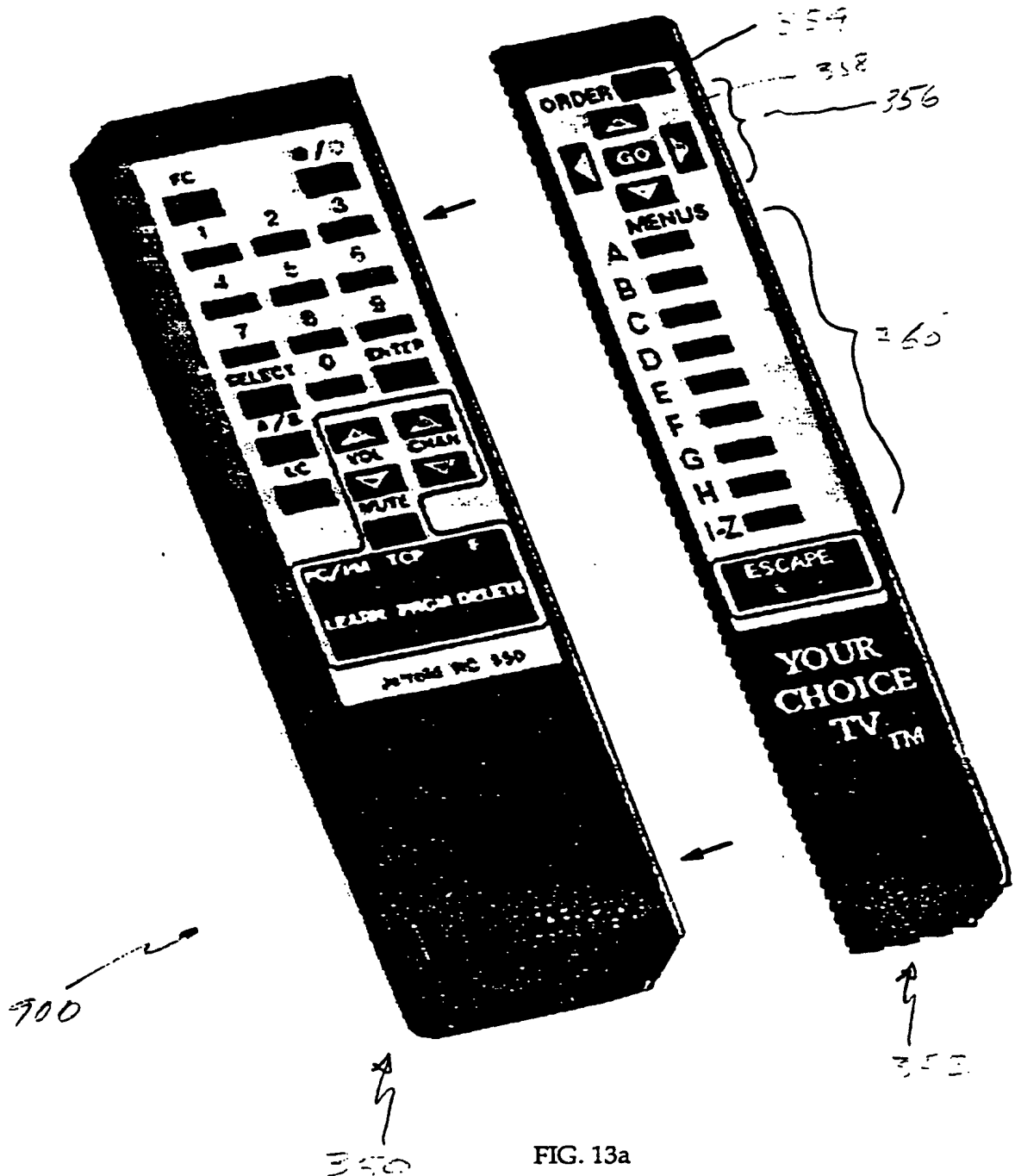
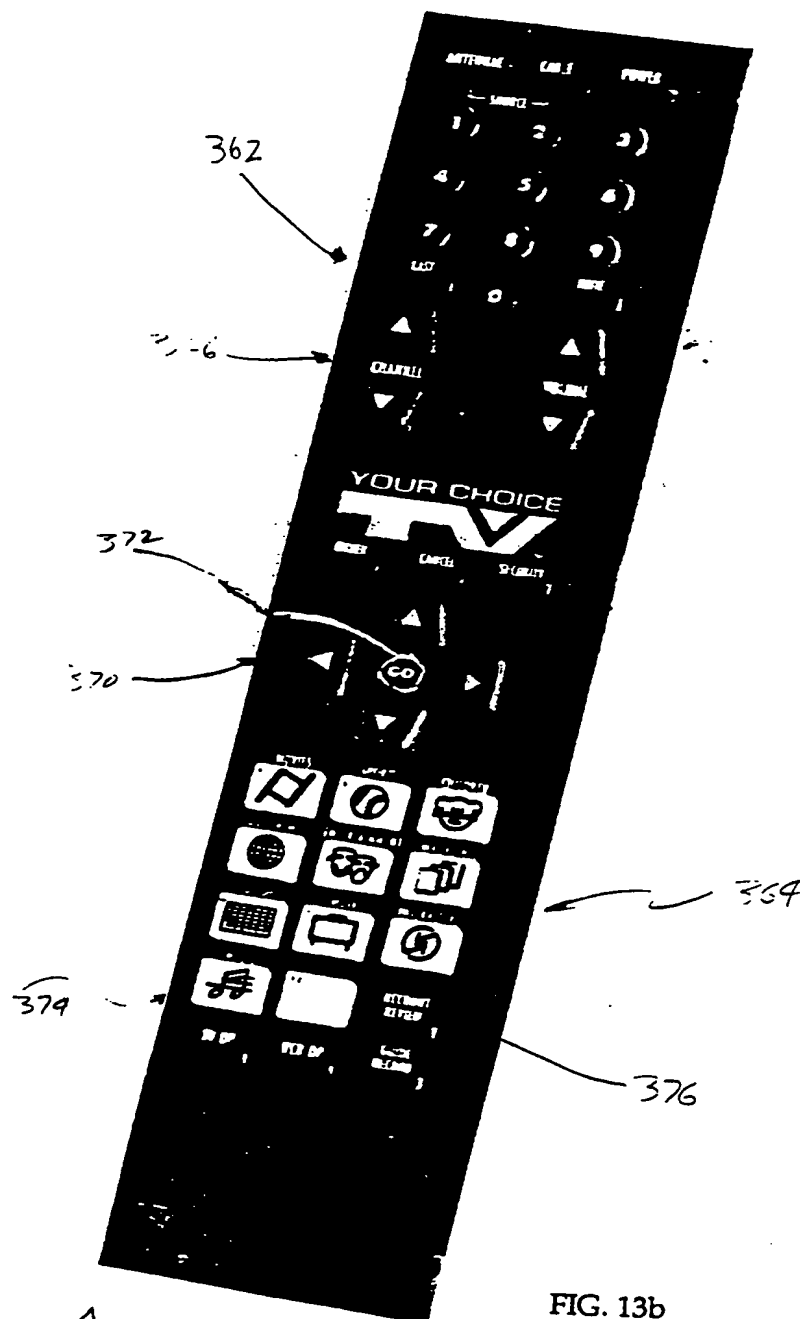


FIG. 13a



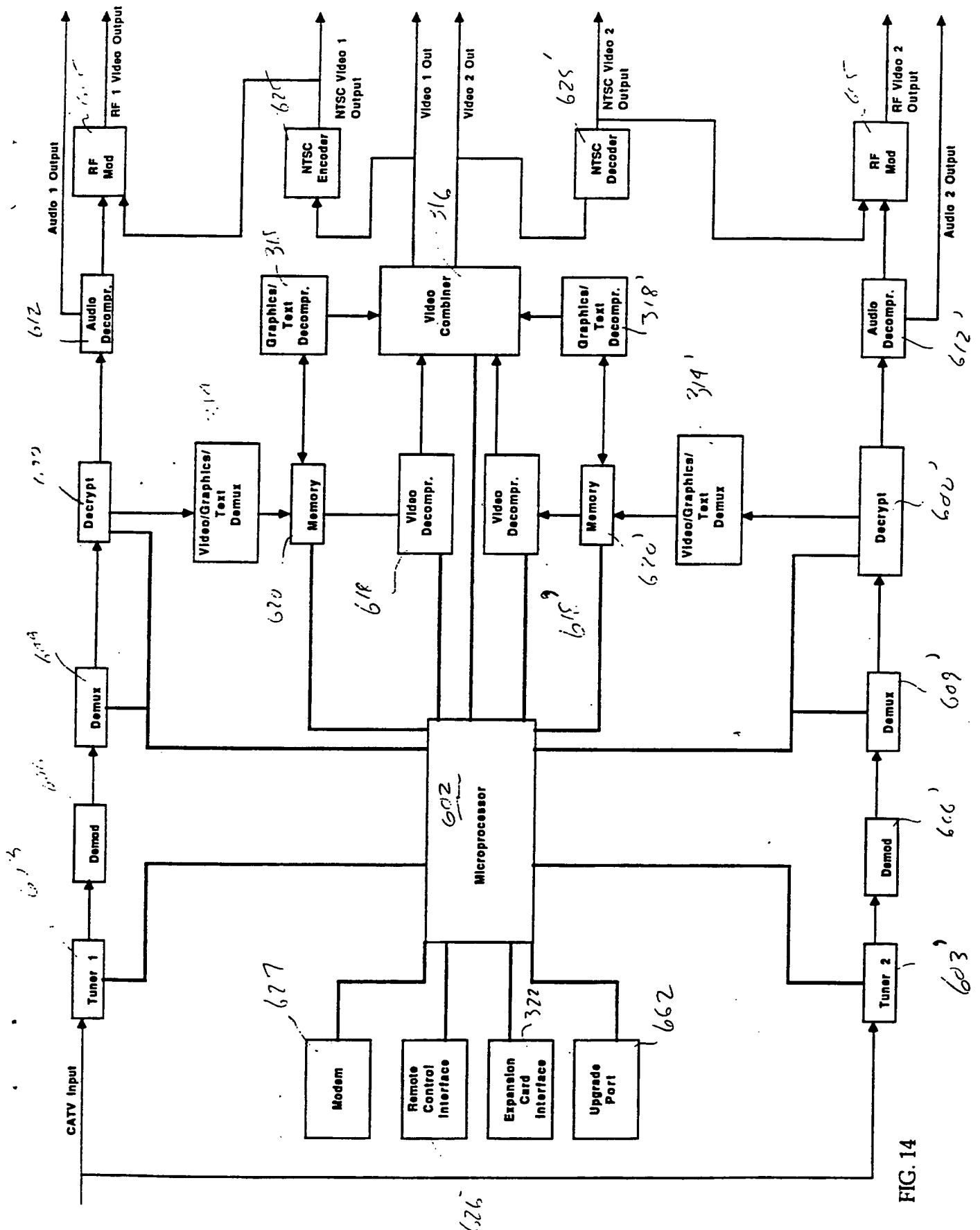
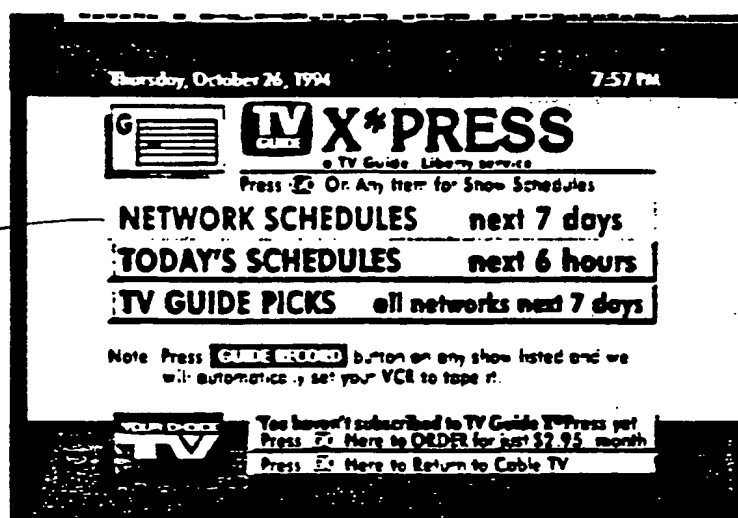


FIG. 14

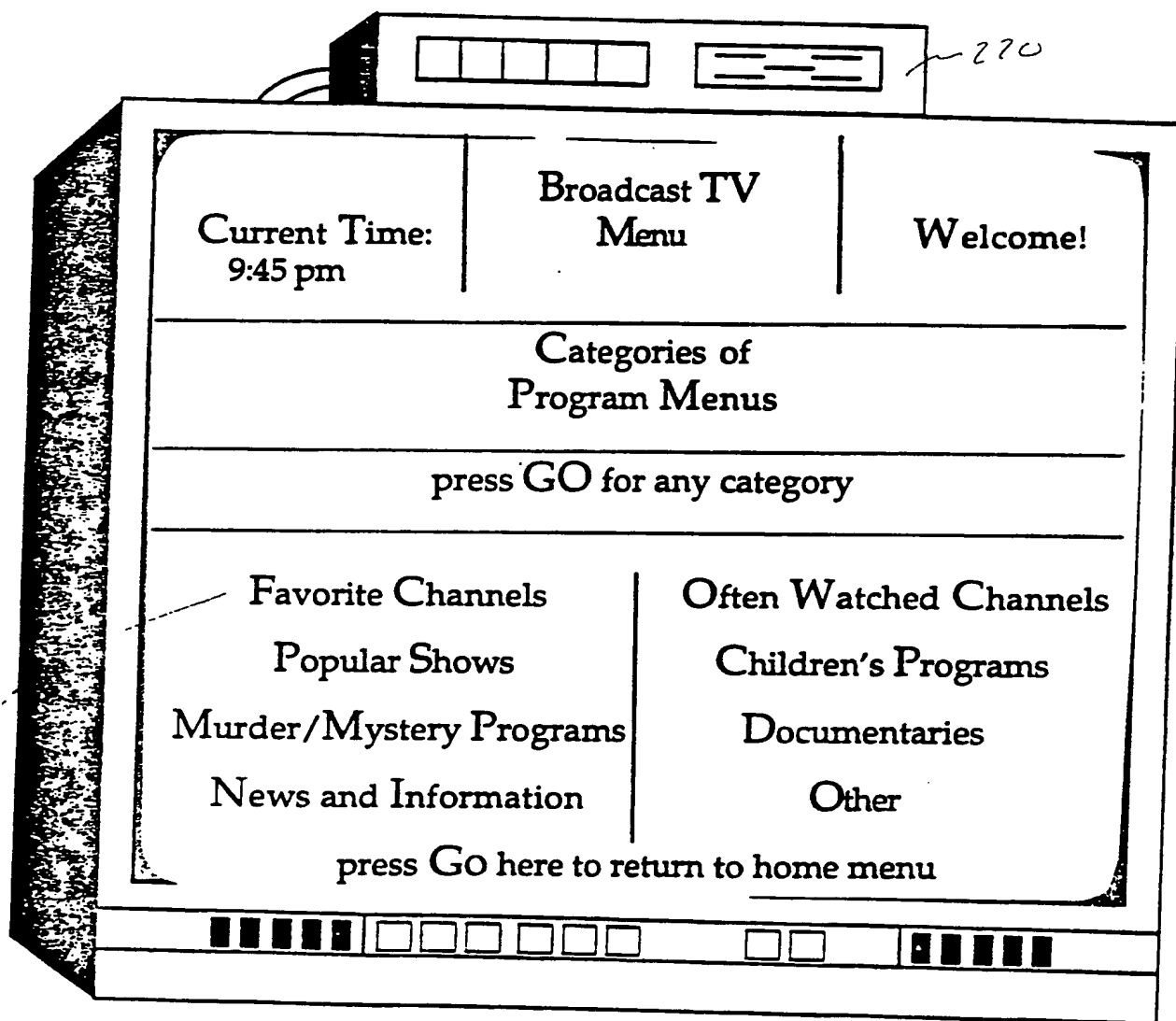
FIG. 15



72

1150

FIG. 16a



112

**MOOD QUESTION MENUS**

LENGTH OF PROGRAM DESIRED

Short	30 minutes or less
Medium	30 to 60 minutes
Long	60 minutes or more

FIG. 16b

Type of Program Desired

Serious
Thoughtful
Light

FIG. 16c

Do you wish an active or passive program?

Active
Passive

FIG. 16d

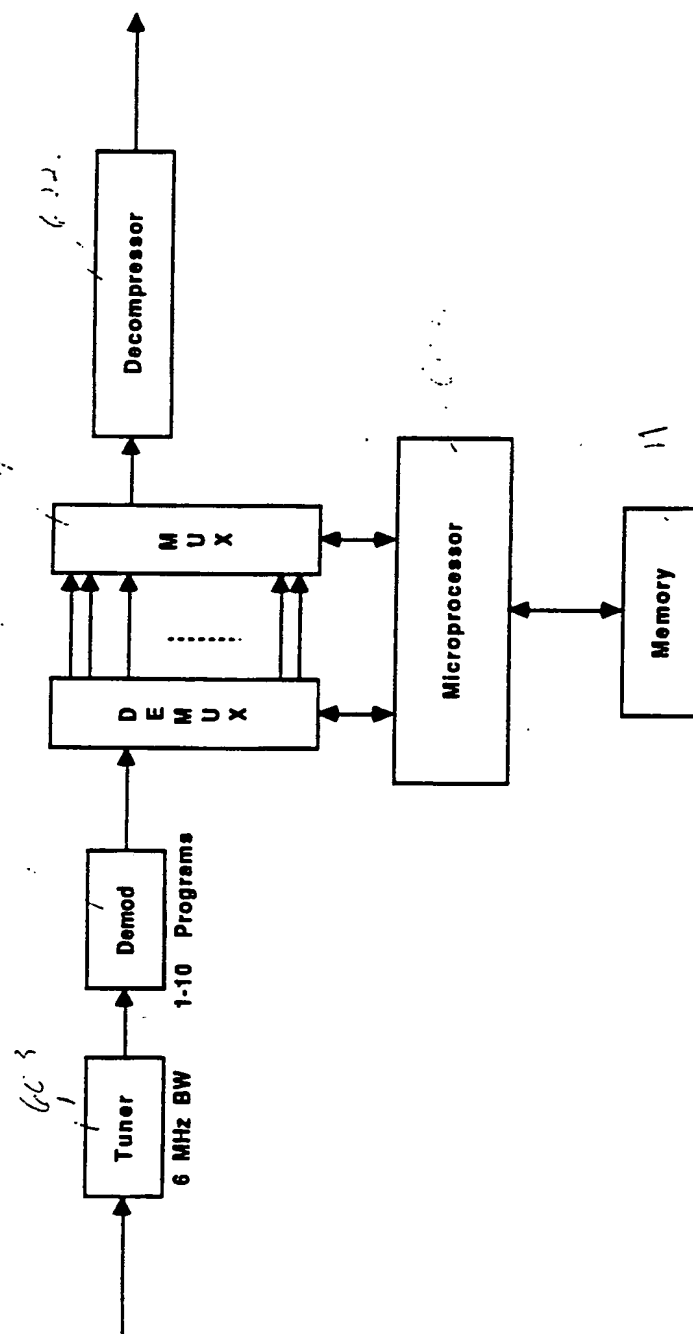


FIG. 17a  
STT CHANNEL SWITCHING HARDWARE: CHANNEL SWITCHING  
WITHIN 6MHz BANDWIDTH

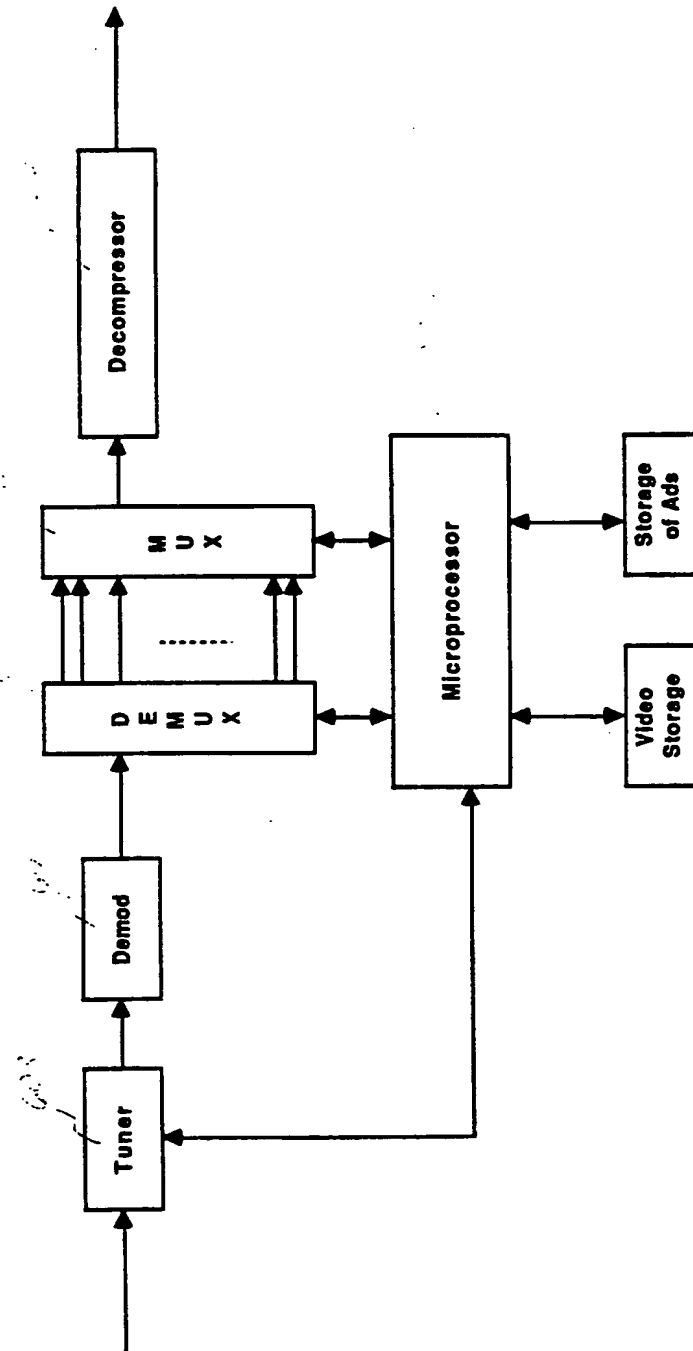
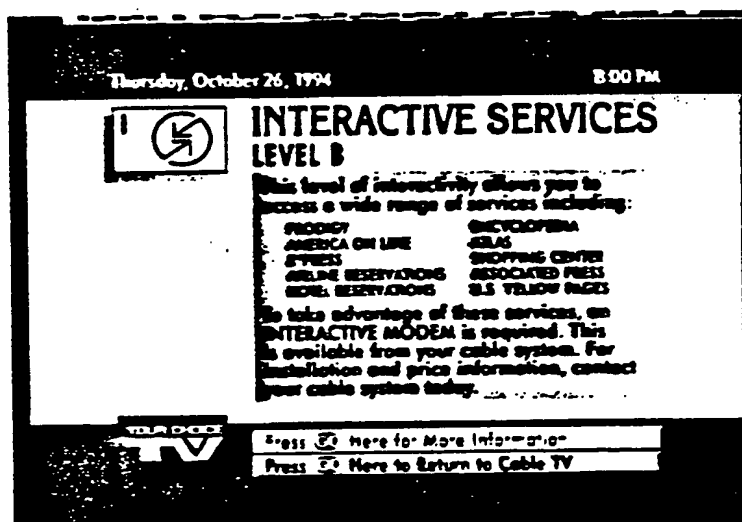
STT CHANNEL SWITCHING HARDWARE: CHANNEL SWITCHING  
OUTSIDE 6MHz BANDWIDTH

FIG. 17b



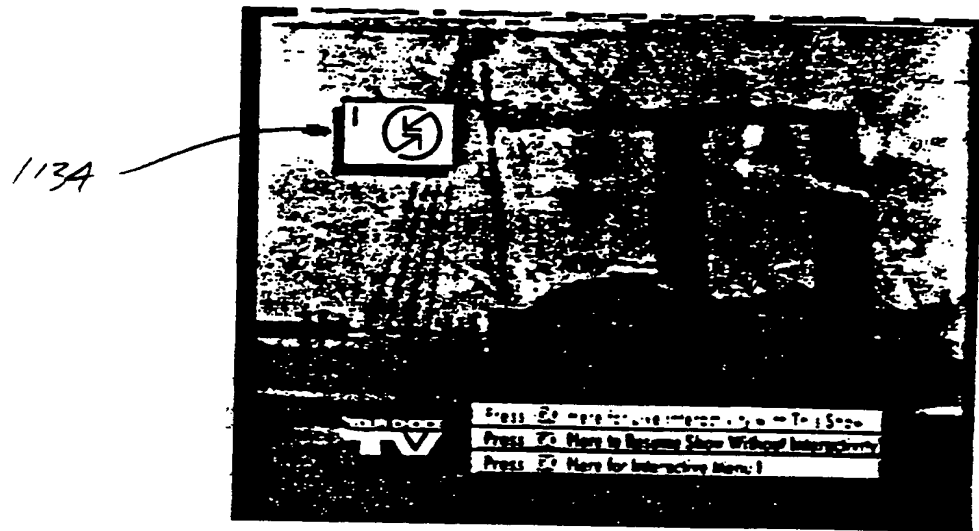
FIG. 18



1120

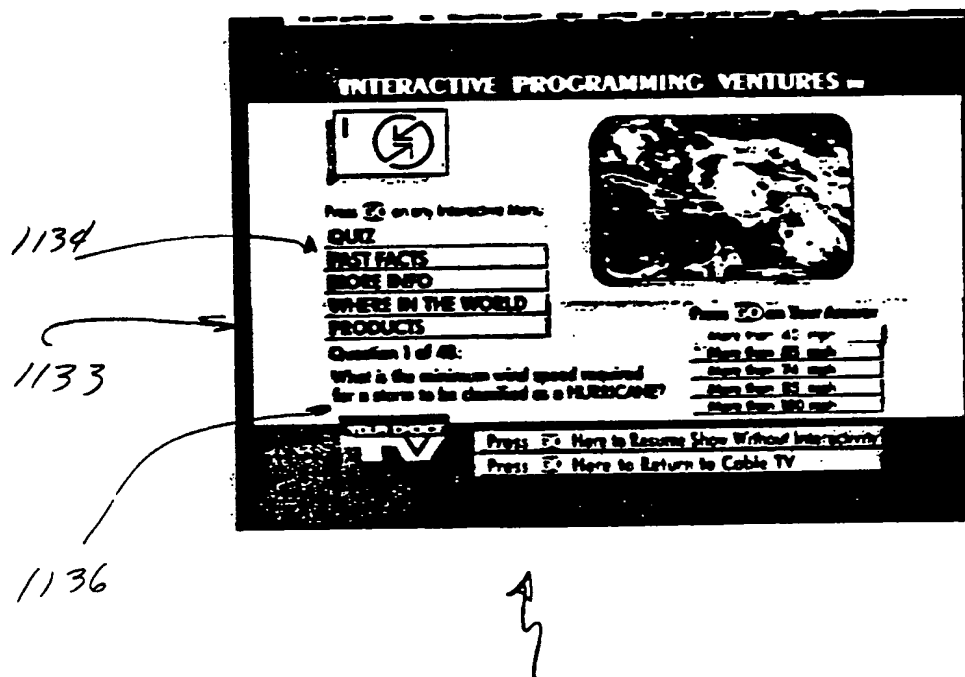
24 / 3 2

FIG. 19a



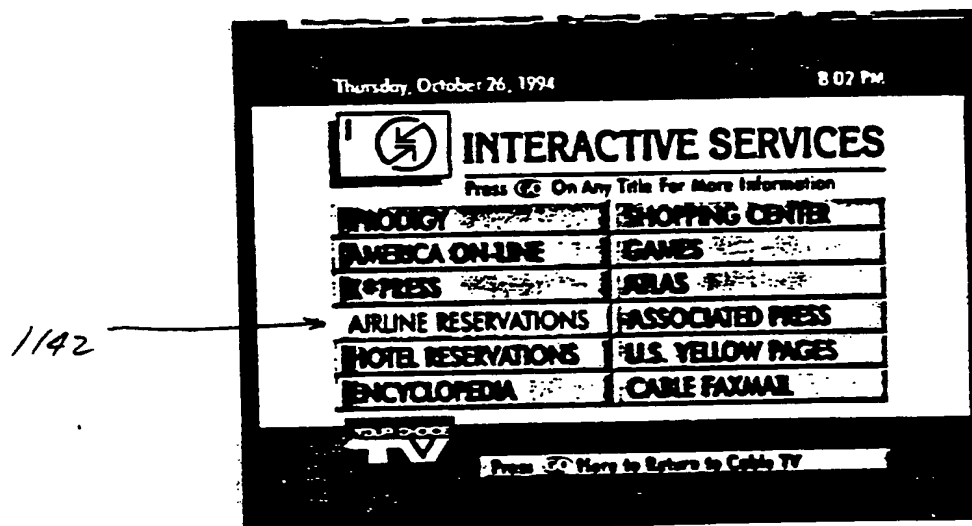
25 / 3 2

FIG. 19b



26 / 3 2


FIG. 20a



27 / 3 2

FIG. 20b

Thursday, October 26, 1994 8:04 PM

 **AIRLINE INFORMATION  
AND RESERVATIONS**(continued)

Here are your airline flight options for a morning departure  
from Phoenix to Dulles.  
Press **GO** on Any Flight to Check Availability and Fare

8:15AM	3:00PM	AMERICAN	40	0
8:30AM	3:15PM	AMERICAN	40	0
8:50AM	3:37PM	DELTA	40	0
9:00AM	3:45PM	DELTA	40	0
9:15AM	3:55PM	DELTA	40	0
9:30AM	4:10PM	DELTA	40	0
9:45AM	4:25PM	DELTA	40	0

**TV** Press **GO** Here to Return to Main Menu  
Press **GO** Here to Return to Menu 1  
Press **GO** Here to Return to Cable TV


1144



29 / 3 2

FIG. 20d

Thursday, October 26, 1994 8:06 PM

 **AIRLINE INFORMATION  
AND RESERVATIONS(continued)**

**CREDIT CARD CHARGE**

Press **F2** on  
Credit Card You  
Want to Use.

Amount: \$590.00 Delta Flight 649  
One Way Phoenix to Dallas Date: 11/25/94  
Departs: 8:00AM Arrives: 3:07PM Denver

American Express	Visa	Discover	Master Charge
---------------------	------	----------	------------------

Enter Your Credit Card Number  
2 1 7 7 7 3 5 [ ][ ][ ][ ]

Enter Expiration Date (example 8/9/97)  
Month [ ][ ] Year [ ][ ]

Press **F2** Here to Erase Above and Repeat  
Press **F2** Here to Cancel Above and Exit  
Press **F2** Here to Confirm Above Charge

1156

30 / 3 2

FIG. 21

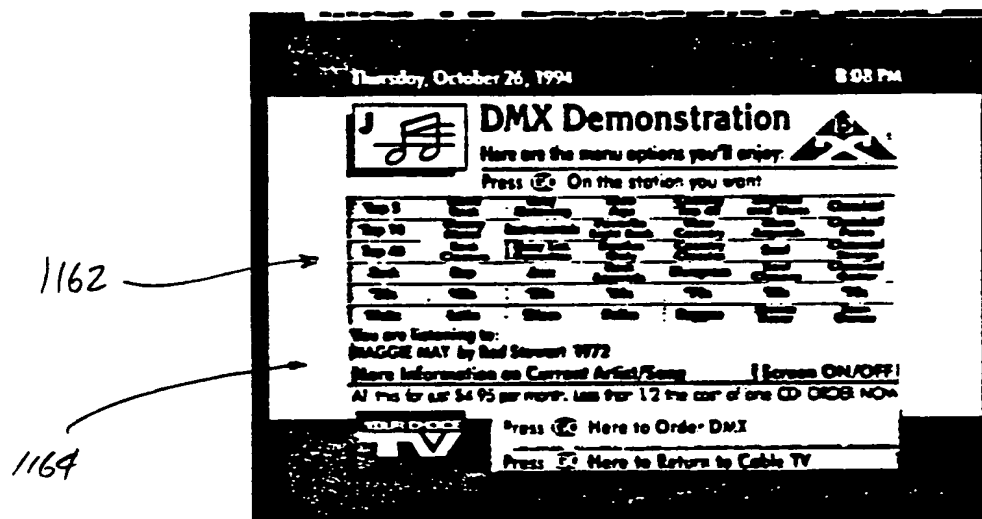
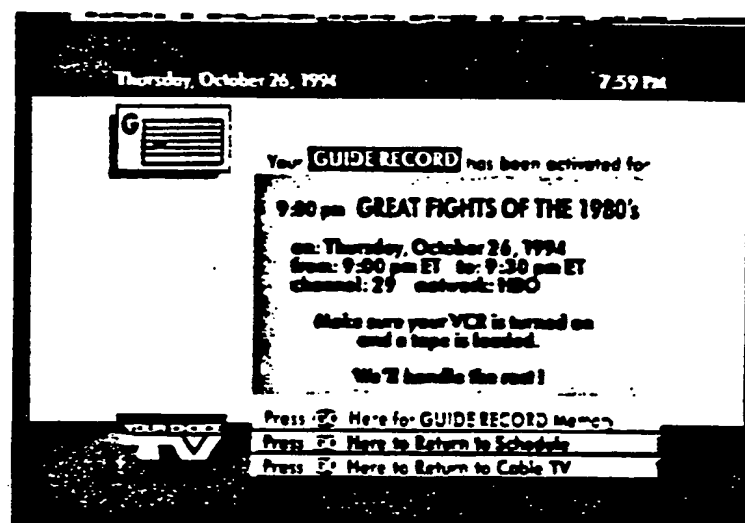


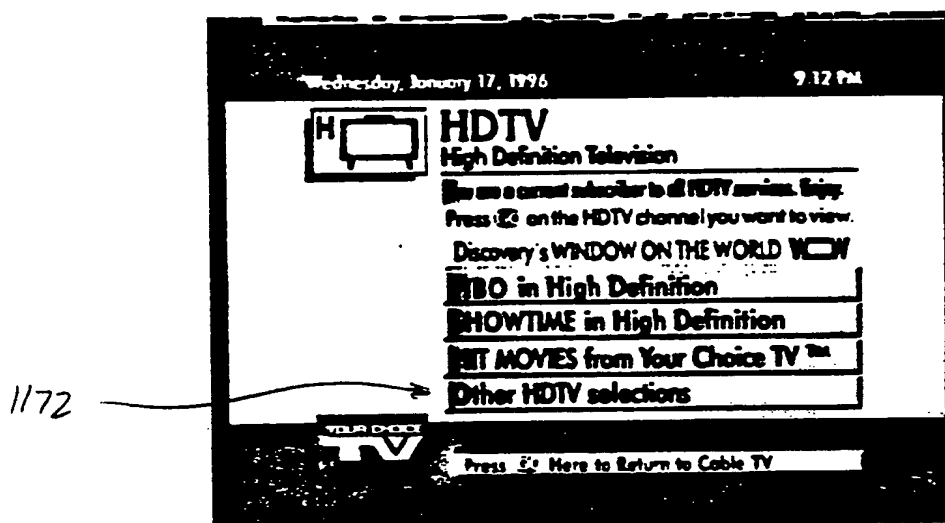


FIG. 22



1170

FIG. 23



1032

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 93/11606

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 5 H04N7/16 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP,A,0 506 435 (SCIENTIFIC ATLANTA) 30 September 1992	1, 10, 15, 17, 19, 25, 40-42
A	see page 14, line 53 - page 16, line 49	2-9, 11-14, 16, 18, 20-24, 26-39, 43
	---	-/--

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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- \*P\* document published prior to the international filing date but later than the priority date claimed

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\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\* & \* document member of the same patent family

Date of the actual completion of the international search

8 March 1994

Date of mailing of the international search report

30. 03. 94

Name and mailing address of the ISA

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Greve, M

## INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/US 93/11606

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JOURNAL OF LIGHTWAVE TECHNOLOGY vol. 10, no. 11, November 1992, NEW YORK, US pages 1760 - 1765 XP000355287 R.OLSHANSKY ET AL. 'SUBSCRIBER DISTRIBUTION NETWORKS USING COMPRESSED DIGITAL VIDEO'	1, 10, 15, 25, 40-42
A	see the whole document	2-9, 11-14, 16-24, 26-39, 43
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Y	US,A,5 144 663 (KUDELSKI ET AL.) 1 September 1992	17, 19
A	see the whole document	1-16, 18, 20-43
---		
A	WO,A,86 01962 (SCIENTIFIC ATLANTA) 27 March 1986 see the whole document	1-43
---		
Y	EP,A,0 355 697 (HITACHI) 28 February 1990	34, 39, 43
A	see page 6, line 19 - page 18, line 23	35-38, 40-42
---		
Y	EP,A,0 402 809 (MAGUS) 19 December 1990	34, 39, 43
A	see page 2, line 5 - page 5, line 5	35-38, 40-42
-----		

# INTERNATIONAL SEARCH REPORT

information on patent family members

Int. Application No

PCT/US 93/11606

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
EP-A-0506435	30-09-92	US-A-	5237610	17-08-93
		AU-A-	1384092	01-10-92
		CN-A-	1066950	09-12-92
		JP-A-	5145923	11-06-93
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US-A-5144663	01-09-92	AU-B-	599646	26-07-90
		AU-A-	7157887	22-10-87
		EP-A-	0243312	28-10-87
		JP-A-	63023488	30-01-88
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WO-A-8601962	27-03-86	US-A-	4885775	05-12-89
		AU-B-	586832	27-07-89
		AU-A-	4800785	08-04-86
		CA-A-	1266525	06-03-90
		EP-A, B	0194289	17-09-86
		JP-T-	62500486	26-02-87
		US-A-	4890319	26-12-89
		US-A-	4829569	09-05-89
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EP-A-0355697	28-02-90	JP-A-	2054646	23-02-90
		US-A-	5027400	25-06-91
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EP-A-0402809	19-12-90	US-A-	5101267	31-03-92
		AU-B-	634242	18-02-93
		AU-A-	5693790	20-12-90
		CA-A-	2018539	13-12-90
		CN-A-	1048136	26-12-90
		JP-A-	3064286	19-03-91
		US-A-	5257099	26-10-93
		US-A-	5223923	29-06-93



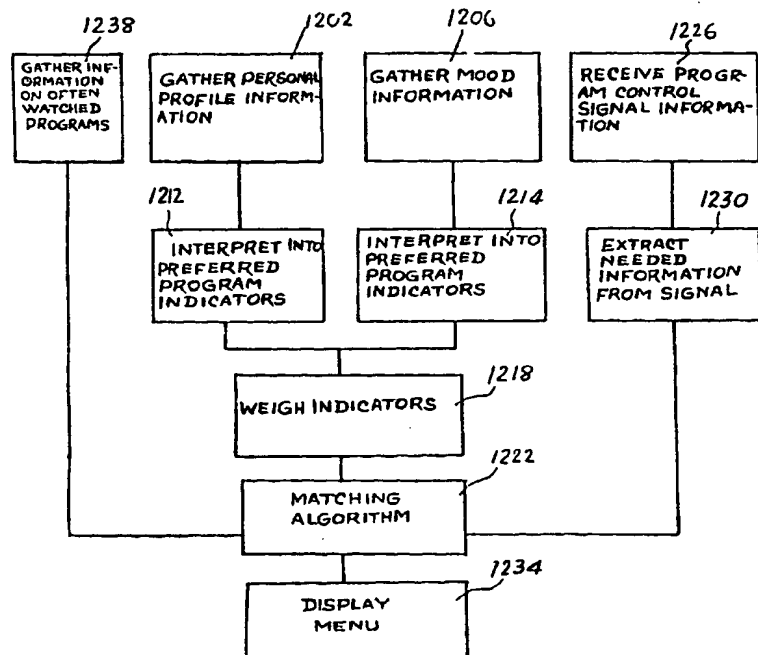
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> : H04N 7/16, 7/173		A1	(11) International Publication Number: WO 94/14284
			(43) International Publication Date: 23 June 1994 (23.06.94)
(21) International Application Number: PCT/US93/11708 (22) International Filing Date: 2 December 1993 (02.12.93) (30) Priority Data: 07/991,074 9 December 1992 (09.12.92) US (71) Applicant: DISCOVERY COMMUNICATIONS, INC. [US/US]; 7700 Wisconsin Avenue, Bethesda, MD 20814-3522 (US). (72) Inventors: HENDRICKS, John, S.; 8723 Persimmon Tree Road, Potomac, MD 20854 (US). BONNER, Alfred, E.; 8300 Bradley Boulevard, Bethesda, MD 20817 (US). WUNDERLICH, Richard, E.; 290 Sweet Briar Court, Alpharetta, GA 30201 (US). (74) Agents: NOTO, Aldo; Dorsey & Whitney, 1330 Connecticut Avenue, N.W., Suite 200, Washington, DC 20036 (US) et al.		(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	

(54) Title: REPROGRAMMABLE TERMINAL FOR SUGGESTING PROGRAMS OFFERED ON A TELEVISION PROGRAM DELIVERY SYSTEM

## (57) Abstract

A novel reprogrammable set top terminal (220) for a television program delivery system (200) which suggests programs for viewing is described. The invention relates to methods and apparatus for reprogramming set top terminals (220), and selecting and displaying programs to suggest to subscribers for viewing. The invention is particularly useful in television program delivery systems (200) with hundreds of channels of programming, a menu driven program selection system, and a program control information signal which carries data and identifies the available program choices. Specifically, the invention relates to remote reprogramming of terminal memory and the gathering and analysis of data for selecting programs to suggest to a subscriber. The invention is a terminal which includes a means for receiving incoming signals, a processor (602), memory, and a means to generate menu screens for display on a TV or monitor. Various data gathering and analysis techniques are used to customize selection of programs for display on a menu.



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GA	Gabon				

**REPROGRAMMABLE TERMINAL FOR SUGGESTING  
PROGRAMS OFFERED ON A TELEVISION PROGRAM  
DELIVERY SYSTEM  
RELATED APPLICATIONS**

5           This application is a continuation-in-part of application  
Serial Number 07/991,074 filed December 9, 1992 entitled  
TELEVISION PROGRAM PACKAGING AND DELIVERY  
SYSTEM WITH MENU DRIVEN SUBSCRIBER ACCESS. The  
following other continuation-in-part applications, also based  
10       on the above-referenced patent application, are incorporated  
herein by reference:

Ser. No. 08/160,280, PCT/US93/11616, entitled NETWORK  
CONTROLLER FOR CABLE TELEVISION DELIVERY  
SYSTEMS, filed December 2, 1993;

15       Ser. No. 08/160,282, PCT/US93/11617, entitled AN  
OPERATIONS CENTER FOR A TELEVISION PROGRAM  
PACKAGING AND DELIVERY SYSTEM, filed December 2,  
1993;

20       Ser. No. 08/160,193, PCT/US93/11618, entitled SET-TOP  
TERMINAL FOR CABLE TELEVISION DELIVERY SYSTEMS,  
filed December 2, 1993;

Ser. No. 08/160,194, PCT/US93/11606, entitled ADVANCED  
SET-TOP TERMINAL FOR CABLE TELEVISION DELIVERY  
SYSTEMS, filed December 2, 1993;

25       Ser. No. 08/160,283, PCT/US93/11615, entitled DIGITAL  
CABLE HEADEND FOR CABLE TELEVISION DELIVERY  
SYSTEM, filed December 2, 1993

**BACKGROUND OF THE INVENTION**

30       The invention relates to television entertainment  
systems for providing television programming to consumer  
homes. More particularly, the invention relates to a user  
friendly system for providing consumers with television  
programming choices.

35       Advances in television entertainment have been  
primarily driven by breakthroughs in technology. In 1939,  
advances on Vladimir Zworykin's picture tube provided the  
stimulus for NBC to begin its first regular broadcasts. In



1975, advances in satellite technology provided consumers with increased programming to homes.

Many of these technology breakthroughs have produced inconvenient systems for consumers. One example is the ubiquitous three remote control home, having a separate and unique remote control for the TV, cable box and VCR. More recently, technology has provided cable users in certain parts of the country with 100 channels of programming. This increased program capacity is beyond the ability of many consumers to use effectively. No method of managing the program choices has been provided to consumers.

Consumers are demanding that future advances in television entertainment, particularly programs and program choices, be presented to the consumer in a user friendly manner. Consumer preferences, instead of technological breakthroughs, will drive the television entertainment market for at least the next 20 years. As computer vendors have experienced a switch from marketing new technology in computer hardware to marketing better useability, interfaces and service, the television entertainment industry will also experience a switch from new technology driving the market to consumer useability driving the market.

Consumers want products incorporating new technology that are useful, and will no longer purchase new technology for the sake of novelty or status. Technological advances in sophisticated hardware are beginning to surpass the capability of the average consumer to use the new technology. Careful engineering must be done to make entertainment products incorporating new technology useful and desired by consumers.

In order for new television entertainment products to be successful, the products must satisfy consumer demands.

TV consumers wish to go from limited viewing choices to a variety of choices, from no control of programming to complete control. Consumers wish to advance from cumbersome and inconvenient television to easy and convenient television and keep costs down. Consumers do not wish to pay for one hundred channels when due to lack of programming information, they seldom, if ever, watch programming on many of these channels.

The concepts of interactive television, high definition television and 300 channel cable systems in consumer homes will not sell if they are not packaged, delivered and presented in a useable fashion to consumers. The problem is that TV programming is not being presented to consumers in a user friendly manner.

Consumers are already being bombarded with programming options, numerous "free" cable channels, subscription cable channels and pay-per-view choices. Any further increase in TV entertainment choices, without a user friendly presentation and approach, will likely bewilder viewers with a mind-numbing array of choices.

What is needed is an economical system which can present television programs through a user friendly interface which allows the consumer to easily select from among the many program choices.

What is needed is a system that assists the consumer with his program selection.

What is needed is a reprogrammable system for presenting program choices.

What is needed is a system which can be remotely reprogrammed.

What is needed is a system capable of handling hundreds of programs in different formats, be expandable for

future types of programming and be inexpensive. The present invention is addressed to fulfill these needs.

### **SUMMARY OF INVENTION**

5           This invention is a reprogrammable terminal for television program delivery systems which is capable of suggesting programs for viewing. Specifically, the present invention may be remotely reprogrammed and is capable of assisting a subscriber in selecting television programs by  
10           suggesting programs for viewing. This is a particularly useful invention for television program delivery systems with hundreds of channels of programming and a menu driven program selection system.

          Preferably the terminal is located at the television set  
15           top and is used with a television delivery system that includes a program control information signal which carries data and identifies the available program choices. The terminal includes means for receiving incoming signals, a processor, memory and means to generate menu screens for display on  
20           a TV or monitor.

          The terminal can be remotely reprogrammed using an incoming signal. Preferably a software interrupt followed by a memory location or software line number is transmitted via an incoming signal. This is followed by the new software  
25           programming which is written into memory at the set top terminal. Using this method, basic programming as well as menu formats, templates, logos, colors etc. may be changed.

          The terminal of the present invention can also help a subscriber in selecting programs by suggesting programs to  
30           the subscriber. The terminal suggests programs that the subscriber is most likely to watch. The terminal is capable of applying several methods of analysis and a variety of

informational sources to solve the problem of choosing a program that the subscriber is most likely to watch. For example, responsive and "intelligent" methods of analysis may be used with mood, personal profile, and historical program watched and network watched data.

Responsive methods of analysis require a subscriber to respond to a variety of questions or select subjective adjectives from program driven menus. The terminal will pose the questions or lists of subjective entries using menus and the subscriber will respond using a user interface, usually an alpha-numeric remote control. For example, subscriber preferences in mood, type of program, category/genre, actor, year preference and standard rating can be selected from menus as search entries. These entries, or key words which correlate to the entries, will be used to search a program database consisting of abstracts of a multitude of programs. The search results in a list of programs which can be displayed to the user.

Intelligent methods "learn" the subscribers viewing choices through analysis of historical data generally gathered by the terminal in a passive mode.

Through a series of analysis and weighing algorithms, the terminal is able to suggest groups of programs. A menu display of the suggested programs is offered to the subscriber. Within the suggested group of programs, the terminal can also prioritize the programs and determine each programs menu position.

It is an object of the invention to provide a user friendly interface for subscribers to access television programs.

It is an object of this invention to assist viewers in choosing programs.

It is an object of this invention to allow subscribers to select a program from among hundreds of choices without a television viewing guide.

5 It is an object of this invention to suggest program selections to viewers.

It is an object of this invention to monitor subscriber viewing choices.

It is an object of this invention to provide a system which can be reprogrammed.

10 It is an object of this invention to provide a system which can be remotely reprogrammed.

It is an object of this invention to provide a system which can handle many television programs and menu selection of programs.

15 These and other objects and advantages of the invention will become obvious to those skilled in the art upon review of the following description, the attached drawings and appended claims.

20 **DESCRIPTION OF THE DRAWINGS**

Figure 1 is a diagram of the primary components of the television delivery system.

Figure 2 is an overview of the television delivery system operations.

25 Figure 3 is a schematic of the operation of the primary components of the system.

Figure 4 is a block diagram of the hardware components of the set top terminal.

30 Figure 5a is a perspective front view of a set top terminal.

Figure 5b is a perspective rear view of a set top terminal.

Figure 6 is a schematic of a Turbo card upgrade for a set top terminal.

Figure 7a is a drawing of a frame format for a program control information signal.

5        Figure 7b is a drawing of a frame format for a polling response from the set top terminal.

Figure 8 is a drawing of the basic menus used in the present invention, including ten major menus represented by icons.

10       Figure 9a is a drawing of storage for on-screen menu templates and other graphics files stored in graphics memory of the set top terminal.

Figure 9b is a drawing showing the hierarchical storage of text in memory for the set top terminal.

15       Figure 9c is a drawing of a flow chart showing the steps required for the microprocessor to retrieve, combine and display a menu.

Figure 10a and 10b are schematics of memory structures for reprogramming the set top terminal.

20       Figure 11a is a drawing of the main menu used for suggesting programs based on viewer responses.

Figures 11b, 11c, 11d and 11e are drawings of submenus used for suggesting programs based on user responses.

25       Figures 12a and 12b are drawings of a broadcast television menu and submenu.

Figures 12c, 12d and 12e are drawings of mood question menus.

30       Figure 13a is a drawing of a method for selecting programs for display.

Figure 13b is a drawing of a more detailed method for selecting programs for display.

Figure 14 is a drawing of a movie ordering/preview menu.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

5

**A. Television Program Delivery System Description**

**1. Introduction**

Figure 1 shows the present invention as part of an expanded cable television program delivery system 200 that dramatically increases programming capacity using compressed transmission of television program signals. Developments in digital bandwidth compression technology now allow much greater throughput of television program signals over existing or slightly modified transmission media. The program delivery system 200 shown provides subscribers with a user friendly interface to operate and exploit a six-fold or more increase in current program delivery capability.

Subscribers are able to access an expanded television program package and view selected programs through a menu-driven access scheme that allows each subscriber to select individual programs by sequencing a series of menus. The menus are sequenced by the subscriber using simple alpha-numeric and iconic character access or moving a cursor or highlight bar on the TV screen to access desired programs by simply pressing a single button, rather than recalling from memory and pressing the actual two or more digit numeric number assigned to a selection. Thus, with the press of a single button, the subscriber can advance from one menu to the next. In this fashion, the subscriber can sequence the menus and select a program from any given menu. The programs are grouped by category so that similar program offerings are found on the same menu.

**2. Major System Components**

In its most basic form, the system uses a program delivery system 200 in conjunction with a conventional concatenated cable television system 210. The program delivery system 200 generally includes (i) at least one operations center 202, where program packaging and control information are created and then assembled in the form of digital data, (ii) a digital compression system, where the digital data is compressed, combined/multiplexed, encoded, and mapped into digital signals for satellite transmission to the cable headend 208, and (iii) a set of in-home decompressors. The program delivery system 200 transports the digital signals to the cable headend 208 where the signals are transmitted through a concatenated cable television system 210. Within the cable headend 208, the received signals may be decoded, demultiplexed, managed by a local central distribution and switching mechanism, combined and then transmitted to the set top terminal 220 located in each subscriber's home over the cable system 210. Although concatenated cable systems 210 are the most prevalent transmission media to the home, telephone lines, cellular networks, fiber optics, Personal Communication Networks and similar technology for transmitting to the home can be used interchangeably with this program delivery system 200.

The delivery system 200 has a reception region 207 with an in-home decompression capability. This capability is performed by a decompressor housed within a set top terminal 220 in each subscriber's home. The decompressor remains transparent from the subscriber's point of view and allows any of the compressed signals to be demultiplexed and individually extracted from the composite data stream and then individually decompressed upon selection by the subscriber. The decompressed video signals are converted



into analog signals for television display. Such analog signals include NTSC formatted signals for use by a standard television. Control signals are likewise extracted and decompressed and then either executed immediately or placed in local storage such as a RAM. Multiple sets of decompression hardware may be used to decompress video and control signals. The set top terminal 220 may then overlay or combine different signals to form the desired display on the subscriber's television. Graphics on video or picture-on-picture are examples of such a display.

Although a single digital compression standard (e.g., MPEG) may be used for both the program delivery system 200 and the concatenated cable system 210, the compression technique used may differ between the two systems. When the compression standards differ between the two media, the signals received by the cable headend 208 must be decompressed before transmission from the headend 208 to the set top terminals 220. Subsequently, the cable headend 208 must recompress and transmit the signals to the set top terminal 220, which would then decompress the signals using a specific decompression algorithm.

The video signals and program control signals received by the set top terminal 220 correspond to specific television programs and menu selections that each subscriber may access through a subscriber interface. The subscriber interface is a device with buttons located on the set top terminal 220 or on a portable remote control 900. In the preferred system embodiment, the subscriber interface is a combined alpha-character, numeric and iconic remote control device 900, which provides direct or menu-driven program access. The preferred subscriber interface also contains cursor movement and go buttons as well as alpha,

numeric and iconic buttons. This subscriber interface and menu arrangement enables the subscriber to sequence through menus by choosing from among several menu options that are displayed on the television screen. In addition, a user may bypass several menu screens and immediately choose a program by selecting the appropriate alpha-character, numeric or iconic combinations on the subscriber interface. In the preferred embodiment, the set top terminal 220 generates the menus that are displayed on the television by creating arrays of particular menu templates, and the set top terminal 220 displays a specific menu or submenu option for each available video signal.

### 3. Operations Center and Digital Compression System

The operations center 202 performs two primary services, packaging television programs and generating the program control information signal. At the operations center 202, television programs are received from external program sources in both analog and digital form. Figure 2 shows an embodiment of the operations center receiving signals from various external sources 212. Examples of the external program sources are sporting events, children's programs, specialty channels, news or any other program source that can provide audio or visual signals. Once the programs are received from the external program sources, the operations center 202 digitizes (and preferably compresses) any program signals received in analog form. The operations center 202 may also maintain an internal storage of programs. The internally stored programs may be in analog or digital form and stored on permanent or volatile memory sources, including magnetic tape or RAM. Subsequent to receiving programming, the operations center 202 packages the

programs into the groups and categories which provide the optimal marketing of the programs to subscribers. For example, the operations center 202 may package the same programs into different categories and menus for weekday, prime-time viewing and Saturday afternoon viewing. Also, the operations center 202 packages the television programs in a manner that enables both the various menus to easily represent the programs and the subscribers to easily access the programs through the menus.

The packaging of the digital signals is typically performed at the operations center 202 by computer assisted packaging equipment (CAP). The CAP system normally includes at least one computer monitor, keyboard, mouse, and standard video editing equipment. A programmer packages the signals by entering certain information into the CAP. This information includes the date, time slot, and program category of the various programs. The programmer and the CAP utilize demographic data and ratings in performing the packaging tasks. After the programmer selects the various programs from a pool of available programs and inputs the requisite information, the programmer, with assistance from the CAP, can select the price and allocate transponder space for the various programs. After the process is complete, the CAP displays draft menus or program schedules that correspond to the entries of the programmer. The CAP may also graphically display allocation of transponder space. The programmer may edit the menus and transponder allocation several times until satisfied with the programming schedule. During the editing, the programmer may direct the exact location of any program name on a menu with simple commands to the CAP.

The packaging process also accounts for any groupings by satellite transponder which are necessary. The operations center 202 may send different groups of programs to different cable headends 208 and/or set top terminals 220.

5 One way the operations center 202 may accomplish this task is to send different program packages to each transponder. Each transponder, or set of transponders, then relays a specific program package to specific cable headends 208 and/or set top terminals 220. The allocation of transponder  
10 space is an important task performed by the operations center 202.

The operations center 202 may also "insert" directions for filling local available program time in the packaged signal to enable local cable and television companies to fill the  
15 program time with local advertising and/or local programming. Consequently, the local cable headends 208 are not constrained to show only programs transmitted from the operations center 202. New set top converters will incorporate both digital and analog channels. Therefore, the  
20 cable headend 208 may combine analog signals with the digital signals prior to transmitting the program signals to the set top terminals 220.

After the CAP packages the programs, it creates a program control information signal to be delivered with the  
25 program package to the cable headend 208 and/or set top terminal 220. The program control information signal contains a description of the contents of the program package, commands to be sent to the cable headend 208 and/or set top terminal 220, and other information relevant  
30 to the signal transmission.

In addition to packaging the signal, the operations center 202 employs digital compression techniques to

increase existing satellite transponder capacity by at least a 4:1 ratio, resulting in a four-fold increase in program delivery capability. A number of digital compression algorithms currently exist which can achieve the resultant increase in capacity and improved signal quality desired for the system. The algorithms generally use one or more of three basic digital compression techniques: (1) within-frame (intraframe) compression, (2) frame-to-frame (interframe) compression, and (3) within carrier compression. Specifically, in the preferred embodiment, the MPEG 2 compression method is used. After digital compression, the signals are combined (multiplexed) and encoded. The combined signal is subsequently transmitted to various uplink sites 204.

There may be a single uplink site 204 or multiple uplink sites (represented by 204', shown in phantom in Figure 1) for each operation center 202. The uplink sites 204 may either be located in the same geographical place or may be located remotely from the operations center 202. Once the composite signal is transmitted to the uplink sites 204, the signal may be multiplexed with other signals, modulated, upconverted and amplified for transmission over satellite. Multiple cable headends 208 may receive such transmissions.

In addition to multiple uplinks, the delivery system 200 may also contain multiple operations centers. The preferred method for using multiple operations centers is to designate one of the operations centers as a master operations center and to designate the remaining operations centers as slave operations centers. In this configuration, the master operations center coordinates various functions among the slave operations centers such as synchronization of

simultaneous transmissions and distributes the operations workload efficiently.

#### 4. Cable Headend

After the operations center 202 has compressed and encoded the program signals and transmitted the signals to the satellite, the cable headend 208 receives and further processes the signals before they are relayed to each set top terminal 220. Each cable headend site is generally equipped with multiple satellite receiver dishes. Each dish is capable of handling multiple transponder signals from a single satellite and sometimes from multiple satellites.

As an intermediary between the set top terminals 220 and the operations center 202 (or other remote site), the cable headend 208 performs two primary functions. First, the cable headend 208 acts as a distribution center, or signal processor, by relaying the program signal to the set top terminal 220 in each subscriber's home. In addition, the cable headend 208 acts as a network controller 214 by receiving information from each set top terminal 220 and passing such information on to an information gathering site such as the operations center 202.

Figure 3 shows an embodiment where the cable headend 208 and the subscriber's home are linked by certain communications media 216. In this particular embodiment, analog signals, digitally compressed signals, other digital signals and up-stream/interactivity signals are sent and received over the media 216. The cable headend 208 provides such signaling capabilities in its dual roles as a signal processor 209 and network controller 214.

As a signal processor 209, the cable headend 208 prepares the program signals that are received by the cable headend 208 for transmission to each set top terminal 220.

In the preferred system, the signal processor 209 re-routes or demultiplexes and recombines the signals and digital information received from the operations center 202 and allocates different portions of the signal to different frequency ranges. Cable headends 208 which offer different subscribers different program offerings may allocate the program signals from the operations center 202 in various manners to accommodate different viewers. The signal processor 209 may also incorporate local programming and/or local advertisements into the program signal and forward the revised signal to the set top terminals 220. To accommodate this local programming availability, the signal processor 209 must combine the local signal in digital or analog form with the operations center program signals. If the local cable system uses a compression standard that is different than the one used by the operations center 202, the signal processor 209 must also decompress and recompress incoming signals so they may be properly formatted for transmission to the set top terminals 220. This process becomes less important as standards develop (i.e., MPEG 2). In addition, the signal processor 209 performs any necessary signal decryption and/or encryption.

As a network controller 214, the cable headend 208 performs the system control functions for the system. The primary function of the network controller 214 is to manage the configuration of the set top terminals 220 and process signals received from the set top terminals 220. In the preferred embodiment, the network controller 214 monitors, among other things, automatic poll-back responses from the set top terminals 220 remotely located at each subscribers' home. The polling and automatic report-back cycle occurs frequently enough to allow the network

controller 214 to maintain accurate account and billing information as well as monitor authorized channel access. In the simplest embodiment, information to be sent to the network controller 214 will be stored in RAM within each subscriber's set top terminal 220 and will be retrieved only upon polling by the network controller 214. Retrieval may, for example, occur on a daily, weekly or monthly basis. The network controller 214 allows the system to maintain complete information on all programs watched using a particular set top terminal 220.

The network controller 214 is also able to respond to the immediate needs of a set top terminal 220 by modifying a program control information signal received from the operations center 202. Therefore, the network controller 214 enables the delivery system to adapt to the specific requirements of individual set top terminals 220 when the requirements cannot be provided to the operations center 202 in advance. In other words, the network controller 214 is able to perform "on the fly programming" changes. With this capability, the network controller 214 can handle sophisticated local programming needs such as, for example, interactive television services, split screen video, and selection of different foreign languages for the same video. In addition, the network controller 214 controls and monitors all compressors and decompressors in the system.

The delivery system 200 and digital compression of the preferred embodiment provides a one-way path from the operations center 202 to the cable headend 208. Status and billing information is sent from the set top terminal 220 to the network controller 214 at the cable headend 208 and not directly to the operations center 202. Thus, program monitoring and selection control will take place only at the



cable headend 208 by the local cable company and its decentralized network controllers 214 (i.e., decentralized relative to the operations center 202, which is central to the program delivery system 200). The local cable company will  
5 in turn be in communication with the operations center 202 or a regional control center (not shown) which accumulates return data from the set top terminal 220 for statistical or billing purposes. In alternative system embodiments, the operations center 202 and the statistical and billing sites are  
10 collocated. Further, telephone lines with modems are used to transfer information from the set top terminal 220 to the statistical and billing sites.

#### 5. Set Top Terminal

The set top terminal 220 is the portion of the delivery  
15 system 200 that resides in the home of a subscriber. The set top terminal 220 is usually located above or below the subscriber's television, but it may be placed anywhere in or near the subscriber's home as long as it is within the range of the subscriber's remote control device 900. In some aspects,  
20 the set top terminal 220 may resemble converter boxes already used by many cable systems. For instance, each set top terminal 220 may include a variety of error detection, decryption, and coding techniques such as anti-taping encoding. However, it will become apparent from the  
25 discussion below that the set top terminal 220 is able to perform many functions that an ordinary converter box cannot perform.

The set top terminal 220 has a plurality of input and output ports to enable it to communicate with other local and  
30 remote devices. The set top terminal 220 has an input port that receives information from the cable headend 208. In addition, the unit has at least two output ports which provide

communications from the set top terminal 220 to a television and a VCR. Certain menu selections may cause the set top terminal 220 to send control signals directly to the VCR to automatically program or operate the VCR. Also, the set top terminal 220 contains a phone jack which can be used for maintenance, trouble shooting, reprogramming and additional customer features. The set top terminal 220 may also contain stereo/audio output terminals and a satellite dish input port.

Functionally, the set top terminal 220 is the last component in the delivery system chain. The set top terminal 220 receives compressed program and control signals from the cable headend 208 (or, in some cases, directly from the operations center 202). After the set top terminal 220 receives the individually compressed program and control signals, the signals are demultiplexed, decompressed, converted to analog signals (if necessary) and either placed in local storage (from which the menu template may be created), executed immediately, or sent directly to the television screen.

After processing certain signals received from the cable headend 208, the set top terminal 220 is able to store menu templates for creating menus that are displayed on a subscriber's television by using an array of menu templates. Before a menu can be constructed, menu templates must be created and sent to the set top terminal 220 for storage. A microprocessor uses the control signals received from the operations center 202 or cable headend 208 to generate the menu templates for storage. Each menu template may be stored in volatile memory in the set top terminal 220. When the set top terminal receives template information it demultiplexes the program control signals received from the

5 cable headend 208 into four primary parts: video, graphics, program logic and text. Each menu template represents a different portion of a whole menu, such as a menu background, television logo, cursor highlight overlay, or other miscellaneous components needed to build a menu. The menu templates may be deleted or altered using control signals received from the operations center 202 or cable headend 208.

10 Once the menu templates have been stored in memory, the set top terminal 220 can generate the appropriate menus. In the preferred embodiment, the basic menu format information is stored in memory located within the set top terminal 220 so that the microprocessor may locally access the information from the set top terminal instead of from an  
15 incoming signal. The microprocessor next generates the appropriate menus from the menu templates and the other menu information stored in memory. The set top terminal 220 then displays specific menus on the subscriber's television screen that correspond to the inputs the subscriber  
20 selects.

If the subscriber selects a specific program from a menu, the set top terminal 220 determines on which channel the program is being shown, demultiplexes and extracts the single channel transmitted from the cable headend 208. The  
25 set top terminal 220 then decompresses the channel and, if necessary, converts the program signal to an analog NTSC signal to enable the subscriber to view the selected program. The set top terminal 220 can be equipped to decompress more than one program signal, but this would unnecessarily  
30 add to the cost of the unit since a subscriber will generally only view one program at a time. However, two or three decompressors may be desirable to provide picture-on-

picture capability, control signal decompression, enhanced channel switching or like features.

5 In addition to menu information, the set top terminal 220 may also store text transmitted from the cable headend 208 or the operations center 202. The text may inform the subscriber about upcoming events, billing and account status, new subscriptions, or other relevant information. The text will be stored in an appropriate memory location depending on the frequency and the duration of the use of the textual message.

10 Also, optional upgrades are available to enhance the performance of a subscriber's set top terminal 220. These upgrades may consist of a cartridge or computer card (not shown) that is inserted into an expansion slot in the set top terminal 220 or may consist of a feature offered by the cable headend 208 or operations center 202 to which the user may subscribe. Available upgrades may include on line data base services, interactive multi-media services, access to digital radio channels, and other services.

20 In the simplest embodiment, available converter boxes such as those manufactured by General Instruments or Scientific Atlanta, may be modified and upgraded to perform the functions of a set top terminal 220. The preferred upgrade is a circuit card with a microprocessor which is electronically connected to or inserted into the converter box.

#### 6. Remote Control Device

30 The primary conduit for communication between the subscriber and the set top terminal 220 is through the subscriber interface, preferably a remote control device 900. Through this interface, the subscriber may select desired programming through the system's menu-driven scheme or

by directly accessing a specific channel by entering the actual channel number. Using the interface, the subscriber can navigate through a series of informative program selection menus. By using menu-driven, iconic or alpha-character access, the subscriber can access desired programs by simply pressing a single button rather than recalling from memory and pressing the actual channel number to make a selection. The subscriber can access regular broadcast and basic cable television stations by using either the numeric keys on the remote control 900 (pressing the corresponding channel number), or one of the menu icon selection options.

In addition to enabling the subscriber to easily interact with the cable system 200, the physical characteristics of the subscriber interface 900 should also add to the user friendliness of the system. The remote control 900 should easily fit in the palm of the user's hand. The buttons of the preferred remote control 900 contain pictorial symbols that are easily identifiable by the subscriber. Also, buttons that perform similar functions may be color coordinated and consist of distinguishing textures to increase the user friendliness of the system.

#### 7. Menu-Driven Program Selection

The menu-driven scheme provides the subscriber with one-step access to all major menus, ranging from hit movies to sport specials to specialty programs. From any of the major menus, the subscriber can in turn access submenus and minor menus by cursor or alpha-character access.

There are two different types of menus utilized by the preferred embodiment, the Program Selection menus and the During Program menus. The first series of menus, Program Selection menus, consists of an Introductory, a Home, Major menus, and Submenus. The second series of

menus. During Program menus, consists of two primary types, Hidden menus and the Program Overlay menus.

5 Immediately after the subscriber turns on the set top terminal 220, the Introductory menu welcomes the subscriber to the system. The Introductory menu may display important announcements from the local cable franchise, advertisements from the cable provider, or other types of messages. In addition, the Introductory menu can inform the subscriber if the cable headend 208 has sent a personal  
10 message to the subscriber's particular set top terminal 220.

After the Introductory menu has been displayed the subscriber may advance to the next level of menus, namely the Home menu. In the preferred embodiment, after a certain period of time, the cable system will advance the  
15 subscriber by default to the Home menu. From the Home menu, the subscriber is able to access all of the programming options. The subscriber may either select a program directly by entering the appropriate channel number from the remote control 900, or the subscriber may sequence through  
20 incremental levels of menu options starting from the Home menu. The Home menu lists categories that correspond to the first level of menus called Major menus.

If the subscriber chooses to sequence through subsequent menus, the subscriber will be forwarded to the  
25 Major menu that corresponds to the chosen category from the Home menu. The Major menus further refine a subscriber's search and help guide the subscriber to the selection of his choice.

From the Major menus, the subscriber may access  
30 several submenus. From each submenu, the subscriber may access other submenus until the subscriber finds a desired television program. Similar to the Major menu, each

successive level of Submenus further refines the subscriber's search. The system also enables the subscriber to skip certain menus or submenus and directly access a specific menu or television program by entering the appropriate commands on the remote control 900.

5 The During program menus (including Hidden Menus and Program Overlay Menus) are displayed by the set top terminal 220 only after the subscriber has selected a television program. In order to avoid disturbing the subscriber, the set top terminal 220 does not display the Hidden Menu until the subscriber selects the appropriate option to display a Hidden Menu. The Hidden Menus contain options that are relevant to the program selected by the viewer. For example, a Hidden Menu may contain options that enable a subscriber to enter an interactive mode or escape from the selected program.

10 Program Overlay Menus are similar to Hidden Menus because they occur during a program and are related to the program being viewed. However, the Program Overlay Menus are displayed concurrently with the program selected by the subscriber. Most Program Overlay Menus are small enough on the screen to allow the subscriber to continue viewing the selected program comfortably.

15 B. Detailed Set Top Terminal Description

25 The set top terminal 220 receives and manipulates signals from the cable headend 208. The set top terminal 220 is equipped with local computer memory and the capability of interpreting the digitally compressed signal to produce menus for the subscriber. The remote control 900 communicates the subscriber's selections to the set top terminal 220. The subscriber's selections are generally based

upon menus or other prompts displayed on the television screen.

5 It is preferred that the signal reaches the subscriber's home in a compressed format and is decompressed prior to viewing. Included in the delivered program signal is information that enables equipment at the subscriber's home to display menus for choosing particular programs. Depending on the particular embodiment, the television program signal may arrive at the subscriber's home through  
10 one or more connections such as coaxial cables, fiber cables, twisted pairs, cellular telephone connections, or personal communications network (PCN) hookups.

The program control information signal is generated by the operations center 202 and provides the network  
15 controller 214 with data on the scheduling and description of programs. In an alternate configuration, this data is sent directly to the set top terminal 220 for display to the subscriber. In the preferred embodiment, the program control information signal is stored and modified by the  
20 network controller 214 and sent to the set top terminal 220 in the form of a set top terminal control information stream (STTCIS). The set top terminal 220 integrates either the program control information signal or the STTCIS with data stored in the memory of the set top terminal 220 to generate  
25 on-screen menus that assist the subscriber in choosing programs for display.

The types of information that can be sent using the program control signal include: number of program categories, names of program categories, what channels are  
30 assigned to a specific category (such as specialty channels), names of channels, names of programs on each channel, program start times, length of programs, description of



programs, menu assignment for each program, pricing, whether there is a sample video clip for advertisement for the program, and any other program, menu or product information.

5           With a minimal amount of information being communicated to the set top terminal 220 on a regular basis, the set top terminal 220 is able to determine the proper menu location for each program and the proper time and channel to activate for the subscriber after a menu selection.

10       The program control information signal and STTCIS can be formatted in a variety of ways and the on-screen menus can be produced using many different methods. For instance, if the program control information signal carries no menu format information, the menu format for creating the menus

15       can be fixed in ROM at the set top terminal 220. In the preferred embodiment, the menu format information is stored at the set top terminal 220 in a temporary memory device such as a RAM or EPROM. New menu format information is sent via the program control information signal

20       or the STTCIS to the set top terminals 200 whenever a change to a menu format is desired.

          In the simplest embodiment, the menu formats remain fixed and only the text changes. In this way the program control information signal can be limited to primarily text

25       and a text generator can be employed in the set top terminal 220. Another simple embodiment uses a separate channel full-time (large bandwidth) just for the menu information.

          Live video signals may be used in windows of certain menus. These video signals can be transmitted using the

30       program control information signal or STTCIS, or can be taken off channels being transmitted simultaneously with the menu display. Video for menus, promos or demos may be

sent to the set top terminal 220 in several formats, including (1) on a dedicated channel, (2) on a regular program channel and scaled to size, or (3) along with the program control information signal. However, in the preferred embodiment, a  
5 large number of short promos or demo video is sent using a split screen technique on a dedicated channel. A multiple window technique may be used with the menus to display a description of a program and one or more video frames that assist the subscriber in selecting the program.

10 Figure 4 shows the basic hardware components of the set top terminal 220. The set top terminal 220 has a tuner 603, digital demodulator 606, decryptor 600, and demultiplexers 609, 616 as well as audio equipment 612 and a remote control interface 626 for receiving and processing  
15 signals from the remote control unit 900. An optional modem 627 allows communication between a microprocessor 602 and the cable headend 208. An NTSC encoder 625 provides a standard NTSC video output.

20 The microprocessor 602 is capable of executing program instructions stored in memory. These instructions allow a user to access various menus by making selections on the remote control 900.

25 The manner in which the video is decompressed and the menus are generated from the program control information signal or STTCIS varies depending on the specific embodiment of the invention. Video decompressors 618 and 622 may be used if the video is compressed. The program control information signal may be demultiplexed into its component parts, and a video decompressor 618,  
30 graphic decompressor, text generator and video combiner 624 may be used to assist in creating the menus.

In addition to the menu format information that is stored in graphics memory, the set top terminal 220 also stores data tracking those programs that have been selected for viewing. By gathering this data, the set top terminal 220 can maintain an accurate record of all programs accessed/watched by storing the data in EEPROM or RAM. Subsequently, this data can be transmitted to the cable headend 208, where it can be used in carrying out network control and monitoring functions. Such data transmissions between the set top terminal 220 and cable headend 208 can be accomplished, for example, through upstream transmission over the cable network or over telephone lines through the use of telephone modems. Where upstream transmission over the cable network is used, the set top terminals 220 can complete data transmissions on a scheduled (e.g., using a polling response or status report to respond to polling requests sent from the cable headend 208) or as-needed (e.g., using a random access technique) basis.

Figure 5a shows the front panel of the set top terminal 220, which includes an infrared sensor 630 and a series of LED displays 640. The LED displays 640 may indicate with an icon or a letter (e.g. A-K) the major menu currently selected by the set top terminal 220 or the channels selected directly by a user, or menu channel selections (e.g., from 1 to 50). Further displays may include current channel, time, volume level, sleep time, parental lock (security), account balance, use of a hardware upgrade, second channel being recorded by VCR, use of the Level D music hardware upgrade in a separate room, and any other displays useful to a subscriber to indicate the current status of the set top

terminal 220. The LEDs 640 may also provide an indication of the digital audio channel currently tuned.

5       The set top terminal 220 includes a flapped opening 635 on its front that allows the insertion of a magnetic cartridge (or similar portable storage device, including optical disk, ROM, EPROM, etc. not shown). This cartridge opening 635 allows the set top terminal 220 to be upgraded or reprogrammed locally with the use of a magnetic tape cartridge.

10       On the top or cover of the set top terminal 220 are located pushbutton controls 645. Any function that can be performed on the remote 900 may also be performed at the set top terminal 220 using the duplicative pushbutton controls 645.

15       Figure 5b shows the back of the set top terminal 220, which includes a pair of output terminals 650, pair of input terminals 652, pair of stereo/audio output terminals 654, satellite dish input port 656, telephone jack 658 and an RS-422 port 660. In addition, an upgrade port 662 and a cover plate 664 are held in place by a series of sheet metal screws. One of the output terminals 650 is for a television and the other is for a VCR. The set top terminal 220 is equipped to handle incoming signals on one or two cables using the input terminals 652. The phone jack 658 and an RS-232 or RS-25       422 port 660 are provided for maintenance, trouble shooting, reprogramming and additional customer features. In alternate embodiments, the telephone jack 658 may be used as the primary mode of communication between the cable headend 208 and the set top terminal 220. This connection 30       is possible through the local telephone, cellular telephone or a personal communications network (PCN).

The basic programming of each set top terminal 220 is located on ROM within the set top terminal 220. Random access memory, the magnetic cartridge capability, and the expansion card slot 635 each allow upgrades and changes to be easily made to the set top terminal 220.

In the preferred embodiment, the set top terminal 220 includes a hardware upgrade port 662, in addition to expansion card slots. The hardware upgrade port 662 accommodates a four-wire (or more) connection for: (1) error corrected, decrypted data output of the set top terminal 220, (2) a control interface, (3) decompressed video output, and (4) a video input port. In the preferred embodiment, multiple wires are used to perform each of the four functions. The four sets of wires are combined in a single cable with a single multipin connector.

In the preferred embodiment, multipin connections may be used for the multiwire cable. The multipin connection 662 may range from DB9 to DB25. A variety of small computer systems interface (SCSI) ports may also be provided. Alternatively, four or more ports may be provided instead of the single port depicted.

Another port 662 is used to attach the various hardware upgrades described below to a set top terminal 220. The preferred embodiment has a number of hardware upgrades available for use with a set top terminal 220, including: (1) a Level A interactive unit, (2) a Level B interactive unit, (3) a Level C interactive unit with compact disc capability, (4) a Level D digital radio tuner for separate room use, and (5) a Level E information download unit. Each of these upgrades may be connected to the set top terminal 220 unit through the upgrade port 662 described earlier. The same four wires in a single cable described earlier may be used.

Existing set top converter boxes such as those made by Scientific Atlanta or General Instruments are presently unequipped to handle the menu selection system of the present invention. Thus, hardware modifications are  
5 necessary in order to use the menu selection system with existing set top converter technology.

A Turbo Card addition to a set top converter is depicted in Figure 6. The Turbo Card 700 shown provides the additional functionality needed to utilize the menu system  
10 with existing set top converter technology. The primary functions the Turbo Card 700 adds to the set top converter are the interpreting of program control information signals, generating of menus, sequencing of menus, and, ultimately, the ability of the viewer to select a channel through the menu  
15 system without entering any channel identifying information. The turbo card also provides a method for a remote location, such as the cable headend 208, to receive information on programs watched and control the operation of the set top converter and Turbo Card 700. The programs watched  
20 information and control commands may be passed from the cable headend 208 to the Turbo Card 700 using telephone lines.

The primary components of the Turbo Card 700 are a PC chip CPU 702, a VGA graphic controller 704, a video  
25 combiner 706, logic circuitry 708, NTSC encoder 710, a receiver 712, demodulator 714, and a dialer 716. The Turbo Card 700 operates by receiving the program control information signal from the cable headend 208 through the coaxial cable. The logic circuitry 708 of the Turbo Card 700  
30 receives data, infrared commands, and synchronization signals from the set top converter. Menu selections made by the viewer on the remote control 900 are received by the set

top converter's IR equipment and passed through to the Turbo Card 700. The Turbo Card 700 interprets the IR signal and determines the program (or menu) the viewer has selected. The Turbo Card 700 modifies the IR command to  
5 send the program selection information to the set top converter 221. The modified IR command contains the channel information needed by the set top converter. Using the phone line and dialer 716, the Turbo Card 700 is able to transmit program access information to the cable headend  
10 208.

In the preferred embodiment, program access information is stored at each set top terminal 220 until it is polled by the network controller 214 using a polling request message format as shown in Figure 7a. This frame format  
15 920 consists of six fields, namely: (1) a leading flag 922 at the beginning of the message, (2) an address field 924, (3) a subscriber region designation 926, (4) a set top terminal identifier 928 that includes a polling command/response (or P/F) bit 930, (5) an information field 932, and (6) a trailing  
20 flag 934 at the end of the message. Figure 7b shows a response frame format 920' (similar to the frame format 920 end, therefore, commonly numbered with the frame depicted in Figure 7a, but with the prime indicator added for clarity) for information communicated by the set top terminal 220 to  
25 the network controller 214 in response to the polling request of Figure 7a.

The eight-bit flag sequence 922 that appears at the beginning and end of a frame is used to establish and maintain synchronization. Such a sequence typically consists  
30 of a "01111110" bit-stream. The address field 924 designates a 4-bit address for a given set top terminal 220. The subscriber region designation 926 is a 4-bit field that

indicates the geographical region in which the subscriber's set top terminal 220 is housed. The set top terminal identifier 928 is a 16-bit field that uniquely identifies each set top terminal 220 with a 15-bit designation followed by an appended P/F bit 930. Although field size is provided by this example, a variety of sizes can be used with the present invention.

The P/F bit 930 is used to command a polling response from the set top terminal 220 addressed, as described below. The response frame format 920' also provides a variable-length information field 932' for other data transmissions, such as information on system updates. The frame format 920' ends with an 8-bit flag (or trailing flag) 934' that is identical in format to the leading flag 922', as set forth above. Other frame formats (e.g., MPEG) will be apparent to one skilled in the art and can be easily adapted for use with the system.

As summarized above, images or programs may be selected for display by sequencing through a series of menus. Figure 8 is an example of one possible structure for a series of menus. Generally, the sequence of menus is structured with an introductory menu, a home menu, various major menus and a multitude of submenus. The submenus can include promo menus and during program menus. For example, at the home menu portion of the sequence of menus and corresponding software routines, a subscriber may select one of the major menus and start a sequence of menu displays. Alternatively, a subscriber may go directly to a major menu by depressing a menu select button on remote control 900.

At any time during the menu sequence, the subscriber may depress a major menu button to move into another series



of menus. In this way, a subscriber may move from major menu to major menu.

5       The various software subroutines executed by the microprocessor 602 allow a subscriber to sequence the menus, navigating through the various menus of the present invention. A subscriber may sequence back through menus or return to the home menu with a single touch of the home menu button on remote 900.

10       An introductory menu screen 1000 automatically appears upon power-up and initialization of the set top terminal 220. From this introductory menu screen 1000, the set top terminal software will normally advance the subscriber to the home menu screen 1010. The home menu 1010 is the basic menu that the subscriber will return to in  
15       order to make the first level of viewing decisions. When the set top terminal software is displaying the home menu 1010, the subscriber is able to access any television programming option. The software allows programming options to be entered through cursor movement on the screen and directly  
20       by button selection on the remote control 900.

      In the normal progression through the menu screens, the software will forward the subscriber to a major menu screen 1020 in response to the subscriber's remote control 900 selection or highlighted cursor selection from the home  
25       menu screen 1010. The selections displayed on the home menu 1010 are for large categories of programming options.

      Following the major menu 1020, the subscriber may navigate through one or more submenu screens 1050 from which the subscriber may choose one particular program for  
30       viewing. For most programming selections, the user will proceed from the home menu 1010 to a major menu 1020 and then to one or more submenus 1050. However, for

certain programming options or functions of the set top terminal 220, the user may skip one or more menus in the sequence.

5       The During Program Menus 1200 are submenus enabled by the set top terminal software only after the subscriber has selected a television program. These menus provide the subscriber with additional functionality and/or additional information while viewing a selected program. The During Program Menus 1200 sequence can be further  
10       subdivided into at least two types of menus, Hidden Menus 1380 and Program Overlay Menus 1390.

      To avoid disturbing a subscriber during viewing of a program, the Hidden Menus 1380 are not shown to the subscriber but instead "reside" at the set top terminal 220  
15       microprocessor 602. The microprocessor 602 awaits a button entry either from the remote control 900 or set top terminal 220 buttons before executing or displaying any Hidden Menu 1380 options. The set top terminal software provides the subscriber with additional functions such as  
20       entering an interactive mode or escaping from a selected program through use of Hidden Menus 1380.

      Program Overlay Menus 1390 are similar to Hidden Menus 1380. However, the Program Overlay Menus 1390 are overlaid onto portions of the displayed video and not  
25       hidden. The software for the Program Overlay Menus 1390 allows the subscriber to continue to watch the selected television program with audio but places graphical information on a portion of the television screen. Most Program Overlay Menus 1390 are graphically generated to  
30       cover small portions of video. Some Overlays 1390 which are by their nature more important than the program being viewed will overlay onto greater portions of the video.

Examples of types of overlay menus 1390 include Notification Menus 1392 and Confirmation Menus 1394. In the preferred embodiment, the software for the Program Overlay Menus 1390 controls the reduction or scales down the (entire) programs video and redirects the video to a portion of the screen.

Submenus provide the cost of viewing the program and the program's length in hours and minutes. From the submenus, the subscriber is given at least three options: (1) to purchase a program, (2) to return to the previous menu, and (3) to press "go" and return to regular TV. The subscriber may also be given other options such as previewing the program.

Using an on-screen menu approach to program selection, there is nearly an unlimited number of menus that can be shown to the subscriber. The memory capability of the set top terminal 220 and the quantity of information that is sent using the program control information signal are the only limits on the number of menus and amount of information that can be displayed to the subscriber. The approach of using a series of menus in a simple tree sequence is both easy for the subscriber to use and simply implemented by the set top terminal 220 and remote control device 900 with cursor movement. A user interface software programmer will find many obvious variations from the preferred embodiment described.

The set top terminal 220 generates and creates menus using, in part, information stored in its graphics memory. A background graphics file 800 will store menu backgrounds and a logo graphics file will store any necessary logos. A menu display and cursor graphics file will store menu display blocks and cursor highlight overlays as well as any other

miscellaneous files needed to build the menus. Using this method of storing menus, the menus can be changed by reprogramming the graphics memory of the set top terminal 220 through instructions from either the network controller 214 or operations center 202.

The microprocessor 602 performs the steps required to create a menu using stored information. The microprocessor 602 fetches a background file, logo file, menu display and cursor file in most instances. The microprocessor 602 fetches text from long-term, intermediate-term, or short-term storage depending on where the text is stored. Using a video combiner (or like device), the stored information is combined with video and the entire image is sent to the television screen for display.

In the preferred embodiment, a graphics controller is used to assist the set top terminal 220 in generating menus. Menu generation by the set top terminal 220 begins with the building of a major menu screen, which includes background graphics for that major menu. The background graphics may include an upper sash across the top of the screen and a lower sash across the bottom of the screen. The background graphics may be generated from the background graphics file 800 in the memory files of the graphics memory (preferably EEPROM). In addition, logo graphics may be generated. Such graphics typically include an icon window, a cable company logo, a channel company logo, and two "go" buttons.

Preferably, the text for each major menu is generated separately by a text generator in the set top terminal 220. Those portions of the text that generally remain the same for a period of weeks or months may be stored in EEPROM or other local storage. Text which changes on a regular basis, such as the movie titles (or other program selections), is

transmitted to the set top terminal 220 by either the operations center 202 or the network controller 214 of the cable headend 208. In this manner, the cable headend 208 may change the program selections available on any major menu 1020 by modifying the program control information signal sent by the operations center 202 and transmitting any changes using the STTCIS.

Day, date and time information are added to each major menu. This information is sent from the operations center 202, the cable headend 208 (signal processor 209 or network controller 214), the uplink site, or generated by the set top terminal 220 internally.

The creation and display of program description submenus is performed by the set top terminal 220 in a manner similar to that described above. Each submenu may be created in parts and combined before being sent to the television screen. Preferably, background graphics and upper and lower sashes are used. Likewise, a video window and half-strip window can be generated from information in storage on the EEPROM.

In addition to graphics and text, some submenus include windows that show video. Such video may be still or moving pictures. Still pictures may be stored in a compressed format (such as JPEG) at the set top terminal 220. Video stills may be transmitted by the operations center 202 through the program control information signal from time to time.

Moving video picture is obtained directly from a current video feed as described above. Depending on video window size, this may require manipulation of the video signal, including scaling down the size of the video and redirecting the video to the portion of the menu screen

which is within the video window of the menu. Alternatively, the video may be obtained from a split screen channel. Such a method involves the use of split screen video techniques to send multiple video clips on a single channel at a given time.

5 The set top terminal 220 would scale the picture, if necessary, and redirect it to the correct position on the screen using known scaling and positioning techniques. Additional circuitry may be required in the set top terminal 220 to perform adequate scaling and repositioning.

10 To avoid the need for redirecting video into the portion of the screen which houses the video window, masking and menu graphics may be used to cover the portions of the channel video that are not needed. This masking technique allows the split screen video to remain in the same portion of

15 the screen that it is transmitted by the operations center 202. The masking is then adjusted to cover the undesired portions of the screen. These masks are stored in the background graphics file similarly to other background files for menus.

20 The split screen video technique may also be used for promoting television programming. Since a great number of short video clips may be sent continuously, full or partial screen promotionals (or informationals) may be provided to the subscriber. With this large quantity of promotional video,

25 the subscriber is given the opportunity to "graze" through new movie or television programming selections. The subscriber simply grazes from promotional video to promotional video until the desired television program is discovered.

30 C. Program Control Information Signal

Throughout the present application, the term "program control information" is being used to indicate

control information coming from the cable headend 208 to the set top terminal 220, whether it is sent directly from the Operations Center 202, processed by the network controller 214 and then forwarded to the set top box, or transmitted over telephone lines.

The program control information signal generated by the Operations Center 202 provides data on the scheduling and description of programs to the network controller 214 or, in an alternate configuration, directly to the set top terminal 220 for display to the subscriber. In the preferred embodiment, the program control information signal is stored and modified by the network controller 214 and sent to the set top terminal 220 in the form of a set top terminal control information stream (STTCIS). This configuration is required to accommodate differences in individual cable systems and possible differences in set top terminal devices. The set top terminal 220 integrates either the program control information signal or the set top terminal control information stream together with data stored in the memory of the set top terminal 220, to generate on-screen displays for assisting the subscriber in choosing programs.

The goal of the menu driven program selection system 200 is to allow the subscriber to choose a program by touring through a series of menus, organized generally as depicted in Figure 8, utilizing the remote control 900 for cursor movement. The final choice in the series of menus will identify one particular channel and one time for activation of that channel. Armed with a channel and activation time the set top terminal 220 can display the selected program on the television for the viewer. To achieve this goal a simple embodiment assigns an intelligent alpha-numeric code to each program. This alpha-numeric code identifies the

category of the program, the menu in which the program should be displayed, its transmission time(s), and the position on the menu that the program should be displayed.

5 In this simple embodiment, the program control information, including menu codes, is sent continuously from the Operations Center 202 to the network controller 214, and ultimately to the set top terminal 220. For example, four hours worth of programming information can be sent via the program control information signal continuously as shown in  
10 Table A.

Table A shows the basic programming information that may be sent to the set top terminal 220. The program descriptions shown are coded abbreviations. For example, C for comedy, N for news, S for sports, A for cartoons, and Tx  
15 for text. If there is a textual description for a program, such as a movie, the description may be given following that program's coded description or may be communicated following the four hours' worth of programming information. As is shown in the coded listing, program descriptions for  
20 programs greater than a half hour in length need not be repeated (each half hour). The video description code informs the set top terminal 220 of whether there is still or live video available to advertise the program.

For example, a sporting program may be assigned a  
25 code of B35-010194-1600-3.25-Michigan St. vs. USC. The letter B would assign the program to category B, sports. The second alpha-numeric character number 3 would assign the program to the third menu of the sports category. The third character of the code, number 5, assigns the program to the  
30 fifth program slot on the third menu. The next six characters, 01/01/94, represent the date. The following four characters, 1600 represent the start time which is followed



by the length of the program and the program name. This entry represents a sports show, a college football game, which will be aired at 4:00PM on New Years day 1994.

**TABLE A****12 PM**

*Program name	*Program length	*Menu code	*Description	*Video
1 Cheers	.5	E24	C	N
2 Terminator	2.0	A33	Tx	S
3 PrimeTime	1.0	D14	N	N
4 Football Special	.5	B24	S	N
•				
•				
•				
•				

**12:30 PM**

*Program name	*Program length	*Menu code	*Description	*Video
1 Simpsons	.5	E14 & C13	C	S
4 Football Game	3.0	B13	S	N
•				
•				
•				

In the 12:30 Channel 1 entry of Table A, two menu codes are shown. By allowing two menu codes, programs that may fit under two different category descriptions may be shown in both menus to the subscriber. With this minimal amount of information being communicated to the set top terminal 220 on a regular basis, the terminal is able to determine the proper menu location for each program and the proper time and channel to activate for the subscriber after his menu selection.

Table B shows an example Events Table that may be downloaded to a set top terminal 220 using the Event.Dat file which contains information about events and pricing. As shown in the table, the three columns of the Events Table identify the field number, the field itself and the type of information downloaded in the Event.Dat file. The first column contains the field numbers 1 through 11. The middle

column contains the corresponding field parameters, including the event type, event ID, global channel ID, price, start time, end time, start date, end date, P- icon, name and description. The third column contains corresponding field type information. Field type information typically consists of an unsigned integer; hours, minutes and seconds; months, day and year; and ASCII character identifier.

**TABLE B**

Field #	Field	Type
1	Event Type 1 = YCTV 2 = Pay-Per-View 3 = Reg. TV	Unsigned Int
2	Event ID	Unsigned Int
3	Global Channel ID	Unsigned Int
4	Price (in Cents)	Unsigned Int
5	Start Time	HH:MM:SS
6	End Time	HH:MM:SS
7	Start Date	MM/DD/YY
8	End Date	MM/DD/YY
9	P-Icon	ASCIIZ
10	Name	ASCIIZ
11	Description	ASCIIZ

Table C shows an example Event.Dat data file. In particular, Table C shows two data streams corresponding to two event types. The first data stream identifies a YCTV™ event in the first field. The second field designates the event ID, which is 1234 in this example. The third field includes the global channel ID number two. The fourth field indicates the cost of 50 cents for this event. The fifth and sixth fields indicate the respective start and end times of 3:00 AM to 3:00 PM, respectively. The seventh and eighth fields show the corresponding start and end dates, designated as 8/25/93 and 8/27/93, respectively. Field nine indicates the P-icon set to PBS.PCX graphics file. Finally, fields ten and

eleven indicate the name and description of the events selected, which in this case are Sesame Street<sup>TM</sup> and Barney<sup>TM</sup>. The second data stream in the Event.Dat example shown in Table C includes analogous information for Terminator IV<sup>TM</sup>, which is designated in field one as a pay-per-view event.

**TABLE C****Event.Dat Example**

10	1'1234'2'50'03:00:00'15:00:00'08/25/93'08/27/93'pbs.pcx'Sesame Street & Barney's Sesame Street and Barney Abstract
	2'1234'2'50'20:00:00'22:00:00'08/25/93'08/25/93't4.pcx'Terminator 4 Terminator 4 Abstract

The program control information signal and STTCIS can be formatted in a variety of ways and the on-screen menus can be produced in many different ways. For instance, if the program control information signal carries no menu format information, the menu format for creating the menus can be fixed in ROM at the set top terminal. This method allows the program control information signal to carry less information but has the least flexibility since the menu formats can not be changed without physically swapping the ROM.

In the preferred embodiment, the menu format information is stored at the set top terminal 220 in temporary memory either in a RAM, FLASH ROM, EEPROM or EPROM. This configuration provides the desired flexibility in the menu format while still limiting the amount of information needed to be communicated via the program control information signal. New menu format information can be sent via the program control information signal or the STTCIS to the set top terminals 220 each time there is a change to a menu.

Program access information for each program watched is stored at the set top terminal 220 until it is polled by the network controller 214 for information retrieval using the program control information signal or STTCIS. This information retrieval can be accomplished by using the polling request message and response formats, 920 and 920' respectively, as shown, and Figures 7a and 7b, and described above, but any suitable polling request and response message format may be used to interrogate each set top terminal 220 sequentially, one by one. The set top terminals 220 are identified by a unique address and set top terminal identifier. It is preferred that the set top terminal 220 transmit information and messages to the network controller 214 only when given permission by the network controller 214 to do so.

Where, for example, specialty programs have been accessed since the previous poll, the set top terminal 220 is given permission to transmit a polling response 920' in the form of a status report that includes any such access information. The network controller's control receiver (not shown) is tasked with the receipt of set top terminal polling responses or status reports. These status reports generally include information that allows the network controller 214 to track a subscriber's program access history.

Figure 7b shows an example of frame format 920' for the status reports received from the set top terminals 220 during the polling cycle. This frame format is identical to the polling request message format 920 and, as described, includes: (1) a leading flag 922' at the beginning of the message, (2) an address field 924', (3) a subscriber region designation 926', (4) a set top terminal identifier 928'

that includes a polling command/response (or P/F) bit 930', (5) an information field 932', and (6) a trailing flag 934' at the end of the message.

5       The information field 932' remains variable in length so that the status of an indeterminate number of programs, represented at 931, accessed can be included in the frame. In this way, the control message length of the polling request message is minimal since the network controller 214 does not transmit such access information. After a polling  
10       response by a given set top terminal 220, however, the control message length increases in proportion to the number of programs accessed.

During transmission, the P/F bit is used to carry out the polling function. In particular, the P/F bit is set to a "1"  
15       position to command a polling response from the set top terminal 220 whose address is identified in the frame. The set top terminal 220 addressed must respond to the command in the same P/F bit also set to the "1" position. The response will include the number of programs accessed  
20       and their corresponding event identification numbers as shown in Figure 7b at 931. In cases where the set top terminal 220 has not accessed any programs since the previous polling cycle, the set top terminal 220 responds with the P/F bit set to "1" and the programs access block  
25       denoting zero programs accessed.

In between polling cycles, the program control information continues to supply the set top terminals 220 with menu information. In the simplest embodiment, the menus remain fixed and only the text changes. Thus, the  
30       program control information signal can be limited to primarily text and a text generator can be employed in the set top terminal 220. This simple embodiment keeps the

cost of the set top terminal 220 low and limits the bandwidth necessary for the program control information. Another simple embodiment uses a separate channel full-time (large bandwidth) just for the menu information. This separate  
5 channel would facilitate the rapid downloading of new graphics for the system and would enhance response time when text and other data information needs to be changed.

In the preferred embodiment, the basic building blocks or templates of the on-screen menu displays will be stored in  
10 graphics memory consisting of nonvolatile RAM, FLASH ROM, EPROM, or preferably, EEPROM, as shown as 620 in Figure 9a. Referring to Figure 4, with the information from the graphics memory 620, the microprocessor 602, graphics decompressor 622, a text generator (not shown in Figure 4,  
15 but incorporated if necessary), and video combiner 624 will build a menu screen.

The memory files of the graphics memory are preferably categorized into three categories, background graphics 800, logo graphics 820, and menu and display  
20 graphics 850, as shown in Figure 9a.

The background graphics file 800 will store menu backgrounds such as: universal main menu backgrounds 804, universal submenu backgrounds 808, promo backgrounds 812 and custom menu formats 816. The logo graphics file 820  
25 will store any necessary logos such as: Your Choice TV™ logos 824, Network logo files 828, cable system logo files 832, studio logo files 836, and graphic elements file 840. The menu display and cursor graphics file 850 will store menu display blocks 854 and cursor highlight overlays 858, as well  
30 as any other miscellaneous files needed to build the menus.

Using this method of storing menus discussed above, the menus can be changed by reprogramming the graphics

memory 620 of the set top terminal 220. To revise the entire design of displayed menus, the network controller 214 or operations center 202 instructs the EEPROM 620 to be erased and reprogrammed with new menu templates. To  
5 change one menu format or logo, the network controller 214 or operations center 202 instructs just the one location in memory to be erased and rewritten. Obviously, this menu reprogramming can also be done locally (at the set top terminal 220) by a servicemen.

10 As shown in Figure 9a, each memory subfile is further divided into various memory blocks. For example, the background graphics file 800 contains the universal main menu backgrounds 804. The universal main menu backgrounds memory 804 includes memory units UM1 860,  
15 UM2 862 and UM3 863. Similarly, the logo graphics file 820 and menu display and curser graphics file 850 contain individual subfile memory blocks (for example, studio logo file 836 has memory block SL1 864; menu display blocks 854 has memory menu display block MD1 866).

20 Figure 9b shows the hierarchical storage of text transmitted from the cable headend 208. Although text may be continuously transmitted with the video signals to set top terminals 220, text may also be transmitted intermittently. In such a case, the text is stored in the set top terminal 220.  
25 Preferably, the text is transmitted and stored in a compressed format using known techniques. Additionally, the text is preferably stored in graphics memory 620 within the set top terminal 220.

30 Depending upon the use of the text, it will be stored in one of three portions of memory. Information sent with the text will either direct the text to a particular portion of memory, or include information as to the priority of text.

The microprocessor 602, part of the set top terminal hardware represented at block 880, may then direct the text to the appropriate memory location for storage.

5 If the text is to be used frequently and over a long period of time a long term storage 875 will be used. If the text will be used for a shorter period of time (for example, a month), the text will be directed to an intermediate storage area 877. If the text is to be used almost immediately, or for a short period of time (for example, within a few days) the  
10 text is directed to a short term storage area 879. The microprocessor 602 locates the appropriate text required for a particular menu and retrieves it from the appropriate portion of memory 620. The text is output from the graphics memory 620 to the text generator 621. Text generated from  
15 the text generator 621 is thereafter directed to text/graphics video combiner 624.

Figure 9c shows the steps performed by the microprocessor 602 for creating a menu based upon a series of overlay screens. These instructions are stored in memory  
20 within the set top terminal 220 in a screens data file. The screens data file instructs the microprocessor 602 on the location of each graphics file on the screen. An example screens data file is shown in Table D, wherein the screens data file specifies menu data positioning in terms of, for  
25 example, x and y pixel positions, height and width, color codes and fonts. Alternatively, instructions or routines may be transmitted from the operations center 202 to be stored in memory within the individual set top terminals 220.



50

TABLE D

	~ The following data lines are for the main menu									
	~									
5	Screen Type		Template File		Description					
	SCREEN	@MAIN	main menu.pcx		Main Menu					
	~									
	Justify	X	Y	Ht	Wd	FColor	BColor	Font		
	STRPOS	Left	'165	'85	'30	'300	'27	'55	FUTUR14.GFT	
10	STRING MAIN MENU									
	~									
	Justify	X	Y	Hght	Wdt					
	PCXPOS	LEFT	'190	'75	'200	'200				
	PCXexample1.pcs									
	~									
15	Justify	X	Y	Ht	Wd	FColor	BColor	Font	X Y Ht Wd	
	ITEMPOS	Left	'120	'100	'20	'400	'15	'25	FUTUR12.GFT '110 '90 '30 '420	
	ITEM @YCTV YOUR CHOICE TV									
	~									
	Justify	X	Y	Ht	Wd	FColor	BColor	Font	X Y Ht Wd	
20	ITEMPOS	Left	'120	'200	'20	'400	'15	'25	FUTUR12.GFT '110 '190 '30 '420	
	ITEM @PPV PAY-PER-VIEW HIT MOVIES									

As shown at block 878 in Figure 9c, initially the microprocessor 602 instructs the tuner 603 to select a channel. The channel is decompressed, error corrected and decrypted, if necessary. If the video is to be reduced in size, so as to be placed within a video window, or is a split screen video window which must be enlarged, the video is scaled to the appropriate size. Additionally, the video may be required to be redirected to a portion of the television screen, accomplished by creating a series of offsets for each pixel location of the video.

Graphics must also be used to create a menu in most instances. As shown in block 882, the microprocessor 602 must fetch a background file, a logo file, and a menu display and cursor file in most instances. Each of these files is decompressed 883, and then combined, block 886.

Similarly, the microprocessor 602 must fetch text, as shown in block 884. Depending upon the memory location of the text, the microprocessor 602 will fetch the text from long-term, intermediate-term, or short-term storage, as described above. Based upon this memory retrieval, the text is generated, block 885, and combined with the video (if any), with as many screens of a decompressed graphics as are necessary, and any text, block 886. The image or portions of the image are stored in the video combiner (for example, combiner 624 of Figure 4) until all overlays are received. Thereafter, the entire image is sent, under direction of another routine, to be displayed on the television screen, as represented by display block 888.

D. Reprogrammable Terminal for Suggesting Programs

1. Reprogramming the Set Top Terminal

In addition to all the features that the set top terminal 220 supports with internal programming resident at the set top, additional features may be added or existing features upgraded through remote reprogramming of the set top terminal 220. In the preferred embodiment, the cable headend 208, specifically the network controller 214, performs the remote reprogramming of the set top terminal 220. The cable headend 208 is able to reprogram the memory of the set top terminal 220. With this capability the cable headend 208 can remotely upgrade most software or data stored in memory at the set top terminals 220. For

example, in the preferred embodiment, the cable headend 208 reprograms the menu format from time to time based upon special events or programming needs, such as Olympic telecasts, presidential elections, etc.

5           Set top terminal reprogramming preferably operates using the program control information portion of the transmitted signal and sending the appropriate data within the program control information. When reprogramming is to occur, the cable headend 208 will send an interruption  
10           sequence within the program control information format that informs the set top terminal 220 that reprogramming information is to follow. In an alternative embodiment, one channel is dedicated for the special programming needs of the set top terminal 220.

15           Significant reprogramming of the set top terminals 220 will occur infrequently. However, the changing of color or menu formats will occur more often. In alternative embodiments, color changes to menus may be accomplished via the program control information itself and does not  
20           require reprogramming from the cable headend 208.

          Using the method of storing menus discussed above with reference to Figure 9a, the menus can be changed by reprogramming the graphics memory 620 of the set top terminal 220. There are at least two methods for  
25           reprogramming graphics memory. First, the instructions for generating the menus can be changed. These instructions are stored within the set top terminal 220 in a file (not shown in Figure 9a). The instructions provide the microprocessor with the location of each graphics file to be  
30           displayed on a menu screen (see Table D). Reprogramming the graphics file can be initiated by either sending an interrupt from the network controller 214 or attaching a 2-4

bit code to the program control information signal or the STTCIS indicating that instructions in graphics memory are going to be changed. The signal also designates either the file name to be changed, or alternatively, the memory locations in the graphics memory to be rewritten.

The new instructions could either be sent in the information field 932 (Figure 7a) of the program control information signal or on a dedicated channel. Upon execution by the microprocessor, the new instructions will be loaded into the appropriate files. Alternatively, the new instructions could be loaded into RAM or disc and later stored in the appropriate memory locations upon execution by the microprocessor. With the new instructions stored in graphics memory, the microprocessor, graphics decompressor, text generator (depicted at 623, Figure 9b) and video combiner can build new menu screens.

Alternatively, the graphics (e.g., background graphics 800, icons, logo's 820, menu display blocks 854, cursor highlight overlays 858, etc.) can be changed directly by accessing and rewriting the files in graphics memory 620. For example, to revise the entire design of displayed menus, the network controller 214 or operations center 202 instructs the memory to be erased and reprogrammed with new menu templates (or background graphics file). In the preferred embodiment, the menu format information of the on screen menu displays is stored at the set top terminal 220 in graphics memory 620 consisting of RAM, ROM, EPROM, or preferably EEPROM. To change menu formats, logos, icons, etc., directly, the network controller 214 or operations center 202 instructs the appropriate memory locations to be erased and rewritten with the new menu data using memory location identifiers in the instructions sent in either the

program control information signal or STTCIS. New menu format information can be sent via the program control information signal or the STTCIS to the set top terminals 220 each time a change in menus occurs.

5           Obviously, this type of remote menu reprogramming can also be done locally (at the set top terminal 220) by loading an external cartridge into the set top terminal 220 containing reprogramming instructions with the graphics changes.

10           In addition to menu reprogramming, the software programs resident at the set top terminal may be reprogrammed. Generally, to reprogram software programs resident at the set top terminal 220, the network controller 214 sends an interruption command via the program control  
15           information signal or STTCIS (hereinafter designated "program control information signal") informing the set top terminal 220 that reprogramming information will follow. The program control information signal also contains memory address locations or instruction lines where reprogramming  
20           will occur. Preferably, both the interrupt and memory address locations are included in the data portion of the program control information signal framework. The data portion of the program control information signal will also include the program changes.

25           Interpreting the reprogramming software resident at the set top terminal 220, the microprocessor 602 will instruct that the reprogramming changes be stored initially in volatile memory such as RAM. After locating the appropriate memory locations or instruction lines, the  
30           microprocessor 602 at the set top terminal 220 reads the frames of program control information received and writes

the programming changes to the appropriate memory locations.

5       There are at least two alternative embodiments for implementing the reprogramming of the set top terminal 220 discussed above. The preferred embodiment is shown in Figure 10a. In this embodiment, the software with reprogramming instructions 1100 is stored in a nonvolatile storage chip (EPROM) 1102 at the set top terminal 220. Since this program is resident in nonvolatile storage, it will be able to continue to execute after a power failure. The current executable program version n is stored on FLASH ROM in storage sectors 0 to x.

10       Reprogramming of the set top executable program can occur at any time. Reprogramming may commence after the sending of an interruption message via the program control information signal informing the set top that reprogramming will follow. The network controller 214 will follow the interruption message with the new program version n+1 in the data portion of the program control information signal.

15       The microprocessor 602 recognizes and interprets the interrupt message and directs the execution of the reprogramming software 1100 stored in EPROM. The reprogramming software 1100 instructs the construction of a file in RAM 1104 to house the new program version n+1, as shown at 1106, and the microprocessor 602 will interpret the program control information signal and direct that the new program version n+1 1106 be stored in RAM 1104, as shown.

20       Once the new program version n+1 1106 is completely loaded in RAM 1104, as indicated by reception of all data packets, the process of reprogramming the FLASH ROM 1108 begins. In this embodiment, the new program version

25       

30

n+1 1106 will be loaded into the same FLASH ROM 1108 as the old program version n 1110. The microprocessor 602 will direct the new program version n+1 1106 to overwrite the old program version n 1110. The old program version n  
5 can be rewritten with the new program version n+1 by initially rewriting all locations in the appropriate sector of FLASH ROM 1108 to zero. This sector of memory is then erased and the sector is rewritten with the data in the new executable program version n+1 1106. This process  
10 continues sector-by-sector until the new program is completely transferred and stored in the memory locations of FLASH ROM 1108. Upon completion of loading the new program version n+1 into the FLASH ROM 1108, the set top terminal 220 will be reset. After resetting, the set top  
15 terminal 220 will commence operating off of the new executable program version n+1.

If there is a failure during the resetting process, the set top terminal 220 will have to send a message to the network controller 214 requesting that the controller resend another  
20 copy of the new program version n+1. The reprogramming process will then begin anew, as described in the preceding paragraphs.

Alternatively, reprogramming can occur with the configuration shown in Figure 10b. The process for  
25 reprogramming in this embodiment is similar to that depicted in Figure 10a and, therefore, is commonly numbered except for different steps or features. However, a current program version n 1110 remains in FLASH ROM (i.e., is not overwritten with the new version n+1) throughout the  
30 process, wherein the new current version will overwrite an old program version n-1 1112. By not overwriting the current program version n 1110, the particular application

being changed can continue to operate in normal fashion in the event of failure. The set top terminal 220 continues to run off the program version n 1110 until the new executable program n+1 1106 is completely loaded in the FLASH ROM 1108

As in the embodiment described above with reference to Figure 10a, the network controller 214 sends an interrupt message via the program control information signal to signify that reprogramming will commence. The new program version n+1 1106 is sent from the network controller 214, or other remote location, in the data frame within the program control information signal.

The microprocessor 602 recognizes and interprets the interrupt message and directs the execution of the reprogramming software 1102. Once the reprogramming software 1102 recognizes the file name of the new program version n+1 1106, the software instructs the construction of a file in RAM to house the new program version n+1 1106. The new program version n+1 1106 is then loaded into RAM 1104. Once all of the packets of the new executable version n+1 1106 are completely loaded in RAM 1104, the process of reprogramming the FLASH ROM 1108 begins. In particular, an instruction commands the initiation of loading the new program version into the sectors X to X plus N of the FLASH ROM 1108. Each sector of memory comprising the old program version n-1 1112 in the FLASH ROM 1108 is rewritten with the new data in the new program version n+1 1106.

If a single FLASH ROM does not have enough memory capacity to store both the current program version n 1110 and new program version, the new program version 1106 can be loaded into a second FLASH ROM.



Upon completion of loading of the new executable 1106 into FLASH ROM 1108, the microprocessor 602 will command that the set top terminal 220 be reset. Resetting the set top terminal 220 will cause the old program version n  
5 1110 to be flushed out, causing the new executable program version n+1 1106 to run.

As an alternative to resetting the entire set top terminal program, the set top executable code can be written modularly, with a main module and a series of sub-modules.  
10 With this code structure, the set top program would not necessarily need to be entirely reset when replacement code is provided to the set top. Instead, individual sub-modules may be selectively replaced. Only when a replacement main module is sent, is resetting of the set top program necessary.

15 The instructions for reprogramming (overwriting) are contained in the main module, which calls sub-modules of code. The sub-modules are not active until called by the main module. During the calling procedure, a check for the existence of replacement code (new code) for that sub-  
20 module is performed. This check may be performed either by a physical check of a particular memory location, the setting of a variable in a particular memory location or other method. If replacement code is found for the called sub-module, the replacement code will be run. After a series of  
25 error checks on the viability of the replacement code, instructions are sent for the replacement code to overwrite the called upon sub-module in the sub-module's memory location.

Although the embodiments describe three specific  
30 methods for accomplishing reprogramming of the set top terminal 220, those of ordinary skill in the art will recognize that the reprogramming methodology is not limited to those

embodiments described above but can also consist of embodiments employing different types and configurations of memory devices. Those skilled in that art will also recognize that the reprogramming methodology is not dependent on receiving new programs or graphic files from the network controller 214 or operations center 202 but the new programs or graphic files could also be generated at either the set top terminal 220 or other remote locations.

## 2. Suggesting Programs Description

### 10 a Overview

Referring to Figures 11a-e, 12a-e, 13a and 13b and 14, the terminal's ability to assist a subscriber in choosing channels or programs for viewing is presented. There are a variety of methods in which a set top terminal 220 can suggest a channel or program for viewing. These methods can be loosely categorized into three groups: (1) responsive methods, (2) intelligent methods and (3) methods which integrate both responsive and intelligent methodologies.

All of the methodologies for suggesting programs have in common the provision of gathering data that is representative of subscriber preferences. The microprocessor 602 will interpret, format and store this data in memory at the set top terminal 220. Alternatively, the subscriber specific data can be stored in memory at the network controller 214. Using program scheduling and descriptive information received from the operations center 202 or network controller 214 in either the program control information signal or STTCIS, and the subscriber specific data, the set top terminal 220 can select programs suited to subscriber viewing preferences based on one of the analytical methodologies described below. These programs can be displayed on the television screen for viewer selection. Once

the subscriber has indicated a selection by using, for example, a remote control 900 utilizing cursor movement, the microprocessor 602 at the set top terminal 220 can match the subscriber selection to the program and direct the set top terminal 220 to tune to the selected program.

With memory and a microprocessor 602 built into the set top terminal 220, "intelligent" methods of determining a subscribers programming preference are possible. By analyzing a subscribers past behavior, the set top terminal 220 can literally "learn" to suggest appropriate programming or channels for a viewer. To accomplish this analysis, clues as to the subscribers behavioral pattern must be saved in the set top terminals memory. These clues, such as programs watched and time periods of television viewing, are analyzed as necessary to develop a profile of the viewer. Most of this information is gathered and stored by the set top terminal 220 unbeknownst to the subscriber. A simple example is the set top terminal 220 "learning" which channels are a subscriber's favorite channels. A simple learning process would involve the set top terminal 220 determining which channels were the most often watched by the subscriber and then assuming that those channels are the subscriber's favorite channels.

More sophisticated learning algorithms can be implemented in the set top terminals 220 via expert systems, for example. These expert systems adapt to changing viewer preferences over time and change the corresponding subscriber profile.

Alternatively, a responsive method of suggesting programs or channels may be used. Using the subscriber interface and menu generation, program selections can be responsive to information gathered from inquiries about the

particular subscriber or from subscriber selected entries descriptive of preferred programming.

5 Methods for suggesting programs or channels can integrate the use of the set top terminal's intelligence and information gathering potential. In order to combine the methods, "weights" are generally assigned to various indicators which assist in determining what channel or program the viewer desires. Following evaluation of the weighted information, program or channel suggestions are made to the viewer. For example, the weights attributed to different preference indicators can be accumulated and processed resulting in a selection signal which could be matched to suggested programming through the use of logic networks.

10 While each of the suggestive embodiments described below are set forth in reference to a set top terminal, numerous hardware variations are possible, including using the embodiments in video rental equipment such as a kiosk.

15 b. Responsive Embodiment Using Program Abstracts

20 In the preferred "responsive" embodiment (depicted in Figures 11a-e), program abstracts are used to facilitate the suggestion of programs to subscribers. The abstracts are preferably created either at the network controller 214 or the operations center 202. They would be similar in text and format to those used to describe movies currently listed in common TV movie guides. Each abstract contains language descriptive of the particular program's contents. These abstracts are preferably stored in a database either at the network controller 214 or set top terminal 220.

25 If the program abstract database is stored locally at the set top terminal 220, it can reside in either ROM, EPROM or

on disc. If stored at the set top terminal 220, the program abstract database will preferably initially be sent from the network controller 214 or operations center 202 on the program control information signal or on a dedicated channel. In this embodiment, updates and changes to the program abstract database can be accomplished as mentioned above in the description regarding reprogramming the graphics memory.

In this embodiment, the program control information is received by the set top terminal 220 and integrated with menu details stored in graphics memory. With this integrated information, the microprocessor, graphics decompressor, text generator and video combiner will generate a main menu screen and series of submenu screens. The microprocessor 602 directs the displaying of the menu screens to the subscriber. The menu screens, as described in more detail below, comprise a graphical display of search criteria. Each particular search criteria has a list of preference entries.

The subscriber will provide responses to the set top terminal 220 by selecting preference entries indicative of the subscriber's programming preferences. For example, the subscriber can utilize a remote control 900 to facilitate the selection of preference entries by touring through the menus with the assistance of a cursor.

Each subscriber entry will then be mapped into a set of key words selected from a downloaded thesaurus. Alternatively, the subscriber entries could be used as the key words. The key words are then used by the microprocessor 602 to search the program abstract database. If the program abstract database is at the network controller 214, the set top terminal 220 will have to send the key words to the network

controller 214. The microprocessor 602 will then select one or more programs to suggest to the subscriber based on the results of the abstract search. These suggested programs will then be displayed on the menu for viewer selection.

5           More specifically, this embodiment can be described with reference to the menu screens in Figures 11a-11e. In this embodiment, as shown in the main menu 1130 depicted in Figure 11a, a list of possible search criteria (hereinafter criteria) 1132, including mood, type, category/genre, actor,  
10           time, year preference and standard rating, are provided to assist in the search of selected program suggestions. The viewer has the option to select as few or as many of the criteria 1132 as desired, with the understanding that the more data provided, the more selective the resulting list of  
15           suggested programs. The subscriber can select a desired criteria 1132 by depressing buttons either on a remote portable controller or on the set top terminal 220 to move a cursor or highlight bar on the TV screen.

          Following selection of a criteria on the main menu, the  
20           viewer may move through one or more submenu screens from which to choose particular entries indicative of programming preferences. As mentioned above, the viewer may choose as few or as many criteria as desired. One criteria depicted in the main menu 1130 is the mood criteria 1134. Upon  
25           selection by the viewer of the mood criteria 1134, a submenu 1136 will appear on the screen, depicted in Figure 11b. The mood submenu 1136 allows the viewer to pick from a list of subjective moods 1138, such as SERIOUS, THOUGHTFUL, LIGHT, TIRED, SAD, etc. Preferably the viewer will use a  
30           cursor or highlight bar to scroll down the list of subjective moods and select the preference entries desired by clicking on a select button on either the remote or on the set top

terminal 220. The viewer can select one or more of these moods with the exception that the program will not allow the selection of what it determines to be mutually exclusive moods (e.g., HAPPY and SAD). This is accomplished by  
5 locking out a mood selection when its opposite has already been chosen.

The selected moods are cross referenced (or mapped) with a list of key words from a downloadable thesaurus table stored preferably in either ROM, EPROM or on disc at the set  
10 top terminal 220. The key words will then be used to directly search the abstracts in the program abstract database (not shown).

Referring back to Figure 11a, the viewer can select the program TYPE criteria 1144 in which to further distinguish  
15 the programs by program preference. Upon selection of the TYPE criteria 1144, the TYPE submenu 1146, as shown in Figure 11c, will appear on the screen. This submenu 1146 consists of a number of descriptive adjectives 1148 that will preferably be used directly as key words to search the  
20 abstracts resident in the program database. The viewer can select one or more adjectives 1148 to make the search more selective.

Again, referring back to Figure 11a, if the viewer selects the standard category/genre criteria 1152 shown in  
25 the main menu, the category/genre submenu 1154 will appear as shown in Figure 11d, allowing the viewer to qualify a search to one or more of the program categories downloaded to the database (example: MOVIE, DRAMA, CHILDREN, etc.).

30 Figure 11a shows that a viewer can also refine a search by selecting a favorite actor 1158. Selecting the actor criteria 1158 will allow a viewer to fill in a name entry window 1160.

The name entry window 1160 is limited to six letters in the preferred embodiment with the cursor on the first location, and a name is entered sequentially one letter at a time. The channel up/down key, either on the remote or set top terminal 220, allows the viewer to scroll forward and backward, respectively, through the alphabet. When the desired letter has been chosen and entered, the viewer can use the volume up/down key to move left and right in the name through all the letter positions, until the actor's name has been fully or partially entered. The search tool will search for all the occurrences of the letters entered. If the name has been fully entered, a precise search of the program abstract database will be conducted for that name. If the name has been only partially entered, the search tool will look for a closest match to the partially entered name.

The TIME criteria 1162 allows a viewer to choose the preferred time of day, the preferred duration (in 30 minute increments up to 2 hours), and the preferred day of the week. An alternative embodiment would allow the viewer to select up to X hour time periods for a certain day in which to search.

The YEAR criteria 1164 preferably comprises groupings of years. For example, the current year and programs five to ten years old, ten to 20 years old, 20 to 40 years old, and older than 40 years. If desired, the viewer can highlight more than one group of years. If the viewer does not highlight any grouping of years, then all years are assumed desired by the viewer.

The STANDARD RATING criteria 1166 allows the viewer to qualify the search to one or more of the MPAA ratings (G, PG, PG-13, R, NC-17).



In alternative embodiments, the actors, time, years, ratings, etc., can also be selected through the provision of submenus similar to those depicted in Figures 11b-11d.

5       The preferred embodiment also provides for "negative" searches. In this type of search, words descriptive of a program type of no interest to the viewer can either be used directly as key words or mapped into key words in the downloaded thesaurus. If the key words are found in a program during a search of the database, the program is  
10       automatically excluded from the selection list. For example, if the viewer does not desire to view any X or R rated movies, the viewer can simply choose to exclude movies rated as X or R by selecting these ratings on the main menu.

15       In this embodiment, after the viewer has selected as many of the entries as desired, and then hits the "go" button or alternatively selects by cursor or highlight a "go" menu item on the menu screen, the corresponding search will commence. Any typical search tool can be used to search the program abstract database. For example, a Boolean search  
20       can be used to scan the database of textual entries and retrieve the textual entries that satisfy the Boolean search. The programs which meet the search criteria (contain the key words corresponding to entries) selected by the viewer will be counted and the count displayed in the "No.  
25       Selections" box 1170 in the upper right hand corner of each of the screens 1130, 1136, 1146, 1154 of Figure 11a through 11d.

30       If the viewer desires to view a list of all of these selections and/or corresponding abstracts, the viewer may select the VIEW option 1172 in the main menu 1130. Upon selection of the view option, the microprocessor 602 instructs the selection list menu 1174, as shown in Figure

11e, to be displayed on the screen. The viewer can scroll down the list by using the cursor and select the desired movie by clicking on the desired program indicated by cursor or highlight. In Figure 11e, for example, the viewer has  
5 selected the John Wayne movie GREEN BERETS. After making the selection, the program is displayed on the screen, but if there are too many or too few programs listed, or the viewer decides not to watch any of the selected programs, the viewer has the option of returning to the main  
10 menu by selecting the RETURN TO MAIN MENU box 1176. Once the main menu screen 1130 is displayed, the viewer may choose to begin a completely new search, or alternatively, may refine the prior search. If the viewer chooses to perform a refined search, the viewer can access  
15 the various submenus and choose further preference entries resulting in a more precise search and fewer number of program selections.

It is understood that this embodiment of searching program abstract databases can be combined with the other  
20 methods described below, including viewer profile data and most often watched information. For example, different criteria can be assigned different weights (weighting the criteria's preference entries). Then based on an evaluation of the weighted preference entries, only those programs  
25 satisfying a minimum weighted index would show up as a selection to be suggested to the viewer.

Alternatively, program indicators can be generated and used in assigning a weight number to programs. The weight a  
30 program is assigned could be based on either most watched program information, favorite channel, or personal profile as described below. The list of suggested entries resulting from the program abstract search methodology described above

could then be further refined and reduced based on the results of accumulating the weighted indicators corresponding to the programs listed. For example, weighted numbers can be assigned to programs based primarily on the category of the program. The weighted numbers are used by the system to refine the search. Those programs suggested from the program abstract search can then be prioritized and either displayed in prioritized order or further refined by deleting programs not satisfying a minimum weight threshold thereby reducing the list of suggested programs displayed to the viewer. The refined list is then displayed to the viewer.

c. Other Program Suggestion Embodiments

In another "Responsive" embodiment, a favorite channel list can be established based on responses to inquiries. In this embodiment, menus can be used to query a subscriber and allow the subscriber to select eight favorite channels for later display. Figure 12a depicts a menu 1180, the Broadcast TV Menu, with a favorite channels category of program menus 1182 for selection. Figure 12b shows an example of a favorite channel program submenu 1184 being displayed. Although a variety of types of information can be requested, mood questions and inquiries on personal information about a subscriber are preferred for this responsive method of selecting programs for viewers.

In another embodiment, both favorite channels and often watched channels features can be utilized during menu selection. As described above, favorite channels can be stored in memory in the set top terminal 220 for later use. In addition to favorite channels, the broadcast TV menu 1180, has a separate often watched channels category 1186 which

allows the subscriber or the set top terminal 220 in a learning mode to choose eight additional channels for display.

5 In another embodiment, in a manner similar to learning the most often watched channels of the subscriber, the terminal can also determine the most often watched programs by the subscriber. After developing (or learning) a list of popular shows or querying the subscriber for a list of popular shows the terminal can display a customized submenu allowing the subscriber to choose one of the  
10 suggested popular shows available for viewing. In order to display suggested programs that are available, the set top terminal 220 must cross reference the available programs with the viewers choices. This can be accomplished using the program control information signal. After the cross  
15 reference, a popular show submenu similar to the favorite channel submenu shown in Figure 12b may be displayed on the television or monitor.

In one embodiment, a sophisticated program viewing suggestion feature is available as an optional feature for the  
20 subscriber. This feature gives the indecisive viewer or lazy viewer specific suggestions as to which programs the viewer should watch. The set top terminal 220 uses a combination of intelligent and responsive methodologies along with a matching algorithm to accomplish the program viewing  
25 suggestion feature.

In order for the set top terminal 220 to make decisions on which programs the subscriber should watch, the terminal creates a personal profile for the particular viewer. Using the data in the particular viewer's personal profile, subscriber  
30 mood information and the television program information available in the program control information signal, the set

top terminal 220 is able to select a group of programs which the particular viewer is most likely to watch.

Specifically, the set top terminal 220 builds a personal profile for each viewer and stores the information in a memory file by viewer name. To build a personal profile, the viewer answers a series of questions presented on a series of menu screens. These personal profile screens request the viewer to input information such as name, sex, age, place of birth, place of lower school education, employment type, level of education, amount of television program viewing per week, and the number of shows in particular categories that the viewer watches in a given week such as, sports, movies, documentaries, sitcoms, etc. A universal remote control 900 with alpha-numeric buttons may be used to assist in entering the demographic data. Any subscriber demographic information which will assist the set top terminal 220 in suggesting television programs to the viewer may be used. This raw data must be interpreted, formatted, and stored in memory by the set top terminal 220. Preferably the gathered data is processed and stored in a relational database. Once a personal profile has been created (in a particular set top terminal 220), it can be indefinitely stored in nonvolatile memory.

Alternatively, the personal profile information may be electronically transmitted to the set top terminal 220 from a remote location such as the cable headend 208 or billing site. In some cable systems, personal profile information is stored at the billing site. This information can be electronically transmitted via phone or cable to the set top terminal 220. The set top terminal 220 must receive the data, interpret the data, and format the data for storage in a database in memory, as well as for later use.

A selection at the home menu screen 1010 (Figure 8) activates the program selection feature. Following activation of the program selection feature, as shown in Figures 12c-12e, the set top terminal 220 will present the viewer with a series of brief questions to determine the viewer's mood at that particular time. For example, the first mood question screen 1190 may ask the viewer to select whether a short (30 minute), medium (30-60 minute), or long (60 plus minute) program selection is desired, as shown in Figure 12c. The second mood question screen 1192 requests the viewer to select between a serious program, a thoughtful program, or a light program, as shown in Figure 12d. And the third mood question screen 1194 requests whether the user desires a passive program or an active program, as shown in Figure 12e. The viewer makes a selection in each question menu utilizing the cursor movement keys and "go" button on his remote control 900. A variety of other mood questions are possible such as the fatigue level of the viewer, whether the viewer is in the mood for older programming, etc.

After the viewer has responded to the mood question menus which determine the viewer's mood, the set top terminal 220 uses a matching algorithm to find the best programming matches for the viewer and displays an offering of several suggested programs to the viewer (three or more programs are preferred). The matching algorithm compares the viewer profile data, mood data, and most often watched program information (if available, or favorite program information) with information about the program derived from the program control information (or STTCIS) signal, such as show category, description type, length, etc. Using the personal profile information and mood questions suggested above, the following types of outcomes are possible.

If the set top terminal 220 is presented with a young female viewer, educated in Boston who watches sitcoms on a regular basis, and desires a short, light, passive program, a match might be found with the 30-minute sitcom Cheers, the  
5 sitcom Designing Women, or Murphy Brown. Taking another example, for a middle-aged male viewer from the Boston area, wishing a longer length, light, passive program, the New England Patriots Football™ game, the Boston Red Sox Baseball™ game or a science fiction movie might be  
10 suggested.

With this program selection feature, the set top terminal 220 can intelligently assist the specific viewer in selecting a television program from among hundreds of available choices. The viewer is preferably offered a graphic  
15 menu of suggested program choices from which to choose.

Instead of the set top terminal 220 requiring an input of personal profile information, the terminal may also "learn" the personal profile information. A subscriber's viewing habits may be "learned" by maintaining historical data on the  
20 subscriber and analyzing this data. The historical data may include the channels (or networks) and types of programs the viewer has most frequently watched, time of viewing, duration of viewing, duration of programs viewed etc. This information must then be analyzed to profile the viewer.

25 In the preferred "learning" embodiment, the personal profile information is time and date sensitive in that program indicators will be different depending on the date and time of day. For example, a working male with a high school education who has been active in sports or enjoys sporting  
30 events might have a heavily weighted sport program indicator during the day on the weekend days but a heavy comedy program indicator in the late evenings on weekdays. His

profile might show light programming on working day evenings. After analysis, the indicators can be communicated to the weighing algorithm and the matching algorithm which selects the suggested television programs. The matching  
5 algorithm may be implemented through the use of a logic network. The logic network includes a signal detector which could be used for storing and accumulating the weighted indicators. Based on the accumulated weighted indicators, the logic network could provide a selection signal for use in  
10 matching to a suggested program.

Examining Figure 13a, two gathering steps are required, personal information and mood information gathering, denoted at blocks 1202, 1206, respectively. As described above, there are several methods in which this  
15 information may be gathered. Once it is gathered, it may be stored (and updated as necessary) for future use. The indicators may be newly calculated for each subscriber entry into the program selection system. Alternatively, at least each time the information gathered is changed or updated,  
20 the information must be reinterpreted and converted into preferred program indicators, blocks 1212, 1214.

Program indicators should at a minimum indicate the type of programming to be suggested. To accomplish this, television programs are divided into program categories  
25 preferably the same or similar to those categories used for the menu sequence for menu selection of programs (described in the detailed description of the set top terminal 220). For example, sports, comedy, news, documentaries, and hit movies may be program categories. Although a variety  
30 of program indicators can be used, the preferred method is to assign a weight to each program category. Thus, a database of information can be analyzed and weights can be assigned to



the program categories such as sports (40), comedy (30), news (20), documentaries (5), hit movies (5).

5 Using the example shown in Figure 13a, a set of preferred program indicators consisting of categories and weights are assigned based on the personal profile data. A second set of preferred program indicators are assigned based upon the mood data. These two sets of preferred program indicators would then be analyzed and weighted, block 1218, prior to entering the matching algorithm, block 10 1222.

In a specific example, a subscribers updated personal profile might indicate: sports (40), comedy (30), news (20), documentaries (5), hit movies (5); The subscribers mood might indicate: sports (40), comedy (20), news (5), 15 documentaries (5), hit movies (30). The weight given to mood might be a factor of three while the weight given to personal profile might be a factor of one, since mood information is the more recent and important information. The weighted indicators passed onto the matching algorithm 20 would be three times the mood indicators plus one times the personal profile indicators, namely: sports (160), comedy (90), news (35), documentaries (20), hit movies (95). Therefore, the matching algorithm will focus on sports but also provide selections in hit movies and comedy. The 25 matching algorithm is unlikely to suggest any programs in the news or documentaries categories.

The more areas of information that are gathered and used for indicators, the more weighing factors and calculations that are necessary by the weighing algorithm. 30 Other more sophisticated methods of weighing the importance of the data may be used.

The matching algorithm receives program control signal information, block 1226, and extracts needed information therefrom, block 1230, then matches programs with subscribers. The matching algorithm involves three primary steps: (1) eliminating programs that are out of the subscribers desired time frame, (2) eliminating programs in program categories that the subscriber is not interested in watching, and (3) determining priority of desired programs. Finally, the selected programs are displayed, block 1234.

The first two steps eliminate the programs in which the viewer has shown no interest. The first step eliminates programs out of time sequence (current start time or next half hour) and outside the desired length (e.g. 30-60 minutes). With two or three hundred channels in the program delivery system this would reduce the program choices by approximately two thirds to roughly 100 programs.

The next step eliminates programs in program categories that have received the lower program indicator numbers. For instance, in the example above the news and documentaries program category received low indicator numbers. Programs in these categories are eliminated. This generally reduces the number of programs by at least 40 percent from about 100 to 60 or so programs.

The next step is to assign weight numbers to each program. Weight numbers are assigned to programs based primarily on the category of the program. If programs are in two program categories (e.g. hit movie and comedy) an average is taken of the two assigned weight numbers for each program category. The weighted numbers are used by the system as the subscribers selection criteria.

Having weighted the programs, the number of relevant programs can be reduced by examination of the weighted

numbers. It is preferred that ultimately the hundreds of available television programs be reduced to the twenty or so programs most likely to be viewed by the subscriber.

5 A variety of methods can be used to determine the final priority of the programs. Where using certain selection methodologies, programs in the same category have the same weight, other finer methods of differentiation may be used. For example, programs receiving the same weight can be further distinguished by network. Programs on the major  
10 networks may take priority over programs on smaller networks. Programs that are on networks that the viewer watches more frequently can be given priority over networks less frequently watched. Another example of differentiation is that newer programs (more recently filmed programs) are  
15 given priority over older programs. Finer methods of gradation may be accomplished by refining the weighted numbers assigned to the programs or through simple reprioritizing of programs on the short list of twenty programs.

20 Following the matching, the programs may be displayed on a menu screen generated as described earlier. A signal identifying the suggested programs is generated to assist in the menu generation process. It is preferred that 4 to 8 selections are shown on a menu screen. If none of these  
25 selections are satisfactory to the viewer, then a second and third menu screen of program choices may be displayed. Upon selection of a program the set top terminal tunes or switches the viewer to the chosen program.

30 In an alternative embodiment, as shown in Figure 13b (commonly numbered with Figure 13a except for block 1238), program watched information, block 1238, can be used directly in the matching algorithm. One way in which

the program watched information can be used directly by the matching algorithm is by determining and using the often watched information in the final decision step. After the matching algorithm has ordered a selection of programs for the viewer the often watched program list may be used to modify or refine the final program list prior to display. For example, the matching algorithm may choose 20 of 100 programs and order the programs 1 through 20 from the most likely to the least likely viewer choices. This ordered list of 20 is compared with the most often watched program list.

A simple use of the list would be to compare between the ordered list of 20 selected programs and the often watched list, to locate the matches or closely related programs and increase the order number of those programs or "bump up" those programs on the ordered list. A second method would be to increase the located programs weighted number before ordering the 20 programs according to weight. In either case, the effect is that the often watched programs are shifted to a higher priority on the list of twenty programs and ultimately may be placed on the first suggested menu screen of programs. A third method of using the information would be to locate any often watched program existing within the 100 current programs and assign each located program a high weighted value before the matching algorithm calculations described above are performed.

In an alternative embodiment, additional coded information is provided to the set top terminal 220 via the program control information signal to assist with the program selection. For example, demographic codes for each program may be sent via the program control information signal. Additional bits could be added to the frame shown in Figure

7a to facilitate the communications of the code from the controller to the set top terminal 220. A code table could be stored in memory at the network controller 214. Each code would correspond to an attribute. In this embodiment, a  
5 program database would comprise a listing of hundreds of programs along with codes which provide descriptive attributes pertaining to the program. These attributes could be similar to the entries already described above in the menus of figures 11a-11e. The demographic codes describe  
10 the subscriber demographics most likely to match with the program. Thus, a comparison of the stored demographics in the personal profile and the demographic codes will render a list of preferred programs for the subscriber. Those skilled in the art will realize that a variety of information may be sent  
15 by code via the program control information signal.

Although the embodiments specifically describe the use of several sources of information to suggest programs to the subscriber (i.e. mood and personal profile), those skilled in the art will realize that any one source of information or many  
20 more sources may be used. Those skilled in the art will also realize that this program suggestion methodology is not limited to the specifics types of information described but can be used with various types of information that indicate a viewer preference.

25 Using these methodology, it is even possible for the set top terminal 220 to suggest programs for two viewers. By using two sets of viewer profile information, the matching algorithm can find the best match for joint viewing. For example, the set top terminal 220 can suggest programs for a  
30 couple watching television simultaneously. The terminal would use the data stored in memory for each of the two viewers and determine the couples program selections which

are similar or overlap. This method of program selection can resolve disputes between viewers.

After a subscriber selects a suggested program from a menu screen or list of the selection feature, the  
5 microprocessor 602 electronically informs the tuning and decompressing hardware of the bandwidth location of the appropriate program (within the television program signal). Armed with this information the set top terminal 220 is able to display the program for the viewer on a television, monitor  
10 or similar device. Alternatively, a preview menu screen 1142 as shown in Figure 14 may be shown to the subscriber which describes and previews the program selection. The preview menu screens may include live video or stills 1144 depicting the program selected.

15 The terms and descriptions used herein are set forth by way of illustration only and are not meant as limitations. Those skilled in the art will recognize that numerous variations are possible within the spirit and scope of the invention as defined in the following claims.

20 What is claimed is:

**CLAIMS**

What is claimed is:

1. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing a program schedule and description data, and subscriber specific data indicative of a subscribers programming preferences, the set top terminal comprising:
  - a means for gathering subscriber specific data indicative of subscriber preferences to be used in selecting programs;
  - a means, connected to the gathering means, for storing subscriber specific data;
  - means for receiving program control information to be used in selecting programs;
  - program selection means, operably connected to the storing means and the receiving means, for selecting one or more programs using the subscriber specific data and program control information whereby the selected programs correspond to subscriber preferences; and
  - means, operably connected to the program selection means, for displaying the selected programs to the subscriber.
2. The set top terminal of claim 1 wherein the means for gathering subscriber specific data further comprises a means for receiving the subscriber specific data indicative of subscriber preferences from a remote location.
3. The set top terminal of claim 1 wherein the set top terminal receives menu details from the program television

delivery system and wherein the means for gathering subscriber specific data further comprises:

a memory means for storing received menu details;

5 a means for generating menu screens by integrating the program control information with the menu details;

a means for displaying menu screens to elicit subscriber responses; and

10 a subscriber interface means for entry of subscriber responses to menu screens.

4. The set top terminal of claim 1 wherein the program selection means further comprises:

15 a means for matching the subscriber specific data to a program described by the program control information; and

wherein the set top terminal further comprises a means for tuning to the program.

20

5. The set top terminal of claim 1 wherein the set top terminal receives program signals, the set top terminal further comprises means for generating a signal identifying a selected program's location on the received program signal.

25

6. The set top terminal of claim 3 wherein the menu details include a cursor overlay and the means for generating menu screens comprises a means for generating cursor overlays, and wherein the subscriber interface means for entry of subscriber responses comprises a means for cursor movement for moving the cursor overlay on menus.

30



7. A method used by a set top terminal for a television program delivery system for suggesting programs to subscribers for display on a television using program control information containing a program schedule and description data, and subscriber specific data indicative of a subscribers programming preferences, the method comprising:

5 gathering subscriber specific data indicative of subscriber preferences to be used in selecting programs;

10 storing subscriber specific data;

receiving a program control information signal to be used in selecting programs;

15 selecting one or more programs using the subscriber specific data and program control information wherein the selected programs correspond to subscriber preferences; and

displaying the selected programs to the subscriber.

20 8. The method of claim 7 wherein the set top terminal generates menus based on menu details received over the program television delivery system further comprising the following steps;

storing menu details;

25 generating menu screens using the stored menu details by integrating the program control information with the menu details;

displaying menu screens whereby the menu screens identify the selected programs; and

30 receiving subscriber responses to the menu screens.

9. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing menu screen details, a program schedule and description data, and subscribers programming preferences, by searching television program abstracts stored in a database for programs which correlate to key words mapped from one or more specific entries, wherein the specific entries are determined by subscriber responses to search criteria containing a plurality of selectable entries on one or more menu screens displayed on a television, comprising:

a means for receiving a program control information;

a means for storing the program abstracts in a database;

a memory means for storing menu screen details; means for generating menu screens using menu details, whereby the menu screens are generated by integrating program control information with the menu details, and whereby the menus list search criteria containing the plurality of selectable entries;

a means for displaying the menu screens;

a subscriber interface means for entry of subscriber responses to the plurality of selectable entries on the menu screens resulting in specific entries;

a means, connected to the receiving means, for mapping the specific entries into the key words;

a means for searching the program abstract database for programs consisting of one or more of the key words;

a program selection means, operably connected to the receiving means and searching means, for

selecting one or more programs, whereby programs are selected based on the results of the searching means; and

5 means, connected to the program selection means, for displaying the selected programs.

10 10. The set top terminal of claim 9 wherein the set top terminal further comprises a means of reprogramming the program abstracts whereby changed program abstracts are received in a program control information signal.

15 11. The set top terminal of claim 9 wherein the subscriber interface means further comprises a means for interpreting the specific entries and a means for storing the specific entries.

20 12. The set top terminal of claim 9 wherein the means for generating menus further comprises a means for creating submenus whereby subscriber selectable entries are listed in the submenu and each submenu corresponds to a search criteria in a main menu.

25 13. The set top terminal of claim 9 wherein the program selection means further comprises:

means for generating preferred program indicators from a remote location;

means for assigning a weight number to programs using the preferred program indicators; and

30 means for refining the list of selected programs by selecting one or more of the programs resulting

from the program abstract search that satisfy a minimum weight criterium.

5 14. The set top terminal of claim 13 wherein the means for refining the list of selected programs further comprises a means for prioritizing the programs.

10 15. The set top terminal of claim 9 wherein the menu details include a cursor overlay and the means for generating menu screens comprises a means for generating cursor overlays, and wherein the subscriber interface means for entry of subscriber responses comprises a means for cursor movement for moving the cursor overlay on menus.

15 16. A method used by a set top terminal for a television program delivery system for suggesting programming to subscribers using program control information containing menu screen details, a program schedule and description data, and subscribers programming preferences by searching  
20 television program abstracts stored in a database for programs which correlate to key words mapped from one or more specific entries, wherein the specific entries are determined by subscriber responses to search criteria containing a plurality of selectable entries on one or more  
25 menu screens displayed on a television, comprising the steps of:

receiving program control information;  
storing the program abstracts in a database;  
storing menu screen details;  
30 generating menu screens using menu details,  
whereby the menu screens are generated by integrating program control information with the menu details,

and whereby the menus list search criteria containing the plurality of selectable entries;

displaying the menu screens;

5 gathering subscriber responses to the plurality of selectable entries on the menu screens resulting in specific entries;

mapping the specific entries into the key words;

searching the program abstract database for programs consisting of one or more of the key words;

10 selecting one or more programs, whereby programs are selected based on the results of the searching means; and

displaying the selected programs.

15 17. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing mood menu details, a program schedule and description data, and subscriber specific data indicative of a subscribers  
20 programming preference determined from subscriber responses to a set of mood questions presented on mood menu screens, the set top terminal comprising:

a means for receiving program control information to be used in selecting programs;

25 a means for obtaining television programming;

a memory means for storing mood menu details;

a means for generating mood menu screens by integrating the program control information with the mood menu details;

30 a means for displaying mood menu screens;

a subscriber interface means for entry of subscriber responses to mood menu screens;

a program selection means, operably connected to the memory means and the receiving means, for selecting one or more programs using the subscriber specific data and the program control information whereby the selected programs correspond to subscriber preferences; and

a means, operably connected to the program selection means, for displaying the selected programs to the subscriber.

10 18. The set top terminal of claim 17 wherein the program selection means comprises:

means for generating preferred program indicators from a remote location; and

15 means for assigning a weight number to programs using the preferred program indicators.

19. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing a program schedule, description data, demographic codes created at a remote location and assigned to each television program, and demographic data created at a remote location describing subscribers using the set top terminal, comprising:

25 a means for receiving program control information;

a memory means for storing demographic data;

30 a program selection means, operably connected to the memory means and the receiving means, for selecting one or more programs using the program control information containing the demographic data and demographic codes;

a means, operably connected to the program selection means, for displaying the selected program.

5 20. A set top terminal used by subscribers of a television program delivery system for suggesting programs using program control information containing a program schedule and description data, and program watched data indicative of a subscribers most watched programs, the set top terminal comprising:

10 a means for receiving program control information;

a means for gathering program watched data;

a memory means for storing program watched data;

15 a program selection means, operably connected to the memory means and the receiving means, for selecting a program using the program watched data and the program control information;

20 a means, operably connected to the program selection means, for displaying the selected program.

21. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing a program schedule and description data, and channel watched data indicative of a subscribers favorite channels, the set top terminal comprising:

25 a means for gathering channel watched data;

30 a means for receiving program control information;

a memory means for storing channel watched data;

a processing means, operably connected to the memory means and the receiving means, for determining suggested favorite channels, comprising:

5 a channel selection means for selecting a plurality of channels using the channel watched data; and  
means to generate a signal identifying the selected channels; and

a means, operably connected to the processing means, for displaying the list of selected channels.

10

22. A system for delivering menu selectable programs to a subscriber in a digital format and for suggesting certain of those delivered programs for viewing by the subscriber, using program control information containing a program schedule,  
15 menu details and description data, wherein the programs are combined and compressed with the program control information, comprising:

a means for converting programs to digital format;

20 a means for generating program control information;

means for packaging the digital format programs using the program control information;

25 means for combining and compressing the packaged programs and program control information into a combined signal;

means for transmitting the combined signal;

a set top terminal associated with the television comprising:

30 a means for receiving the combined signal;



90

a means for creating personal profile information;

a means for storing personal profile information;

5 a means for generating menus from using the program control information and menu details;

a means for gathering viewer mood information using menus;

10 a means for selecting at least one program for suggestion to the viewer, comprising:

a means for integrating personal profile information and viewer mood information into selection criteria;

15 a means for comparing the selection criteria and the program control information; and

a means for matching the selection criteria with one or more programs described by the program control information; and

20 a means for displaying the suggested program to the viewer.

23. A reprogrammable set top terminal for a television delivery system capable of being remotely reprogrammed  
25 wherein information has been previously stored and such previously stored information may be upgraded using updated changes contained in a reprogramming signal, the reprogrammable set top terminal comprising:

30 a means for receiving the reprogramming signal from a remote location whereby the reprogramming signal including a command informing the set top

terminal that reprogramming is to commence followed by updated changes;

a means for interpreting the updated changes from the reprogramming signal;

5 a first means for storing the interpreted changes;

a second means for storing previous information;

10 a means, operably connected to the receiving means and first and second storing means, for processing the reprogramming signal whereby the processing means instructs the transfer of the interpreted changes from the first storing means to the second storing means, commands the rewriting of a the previous information in the second storing means with the interpreted changes, and instructs the set top terminal to reset so that the set top terminal  
15 operates using the interpreted changes.

24. The reprogrammable set top terminal in claim 23 wherein the first means for storing comprises random access memory and wherein the second means for storing  
20 comprises FLASH read/write memory.

25. The reprogrammable set top terminal in claim 23 wherein the processing means comprises reprogramming software, whereby the reprogramming software directs the  
25 reprogramming of the set top terminal.

26. The reprogrammable set top terminal in claim 25 wherein the processing means further comprises erasable programmable read only memory, whereby the  
30 reprogramming software is stored in the erasable programmable read only memory so that the software will continue to execute after a system failure.

27. The reprogrammable set top terminal in claim 25 wherein the processing means further comprises FLASH read/write memory, whereby the reprogramming software is stored in the FLASH read/write memory.

28. The reprogrammable set top terminal in claim 23 further comprising a third means for storing an operational program, whereby the set top terminal can continue to function as normal through the use of the operational program during the entire reprogramming process.

29. The reprogrammable set top terminal in claim 26 wherein the third storage means comprises a FLASH read/write memory.

30. The reprogrammable set top terminal in claim 23 wherein the means for receiving a reprogramming signal further comprises means for receiving graphics instructions and wherein the updated changes are graphics instructions.

31. The reprogrammable set top terminal in claim 23 wherein the means for receiving a reprogramming signal further comprises means for receiving graphics data and wherein the updated changes are graphics data.

32. A method for updating a reprogrammable set top terminal having volatile and nonvolatile memory containing memory locations for a television delivery system capable of being remotely reprogrammed from a remote location so that additional features may be added or existing features

upgraded with a reprogramming signal comprising the following steps:

- 5       receiving a command from a remote location whereby the interrupt command informs the set top terminal that reprogramming is to commence;
- receiving a reprogramming signal, in frames having a control portion and a data portion, the signal designates the memory locations to be updated in a control portion of the signal frame and provides the program
- 10       changes in the data portion of the signal frame;
- reading the program changes from the reprogramming signal;
- storing the program changes in volatile memory;
- instructing the transfer of the program changes
- 15       from the volatile memory to specified memory locations in nonvolatile memory, whereby the new program changes overwrite an old program in nonvolatile memory; and
- resetting the set top terminal to so that the set top terminal operates using the program changes.
- 20

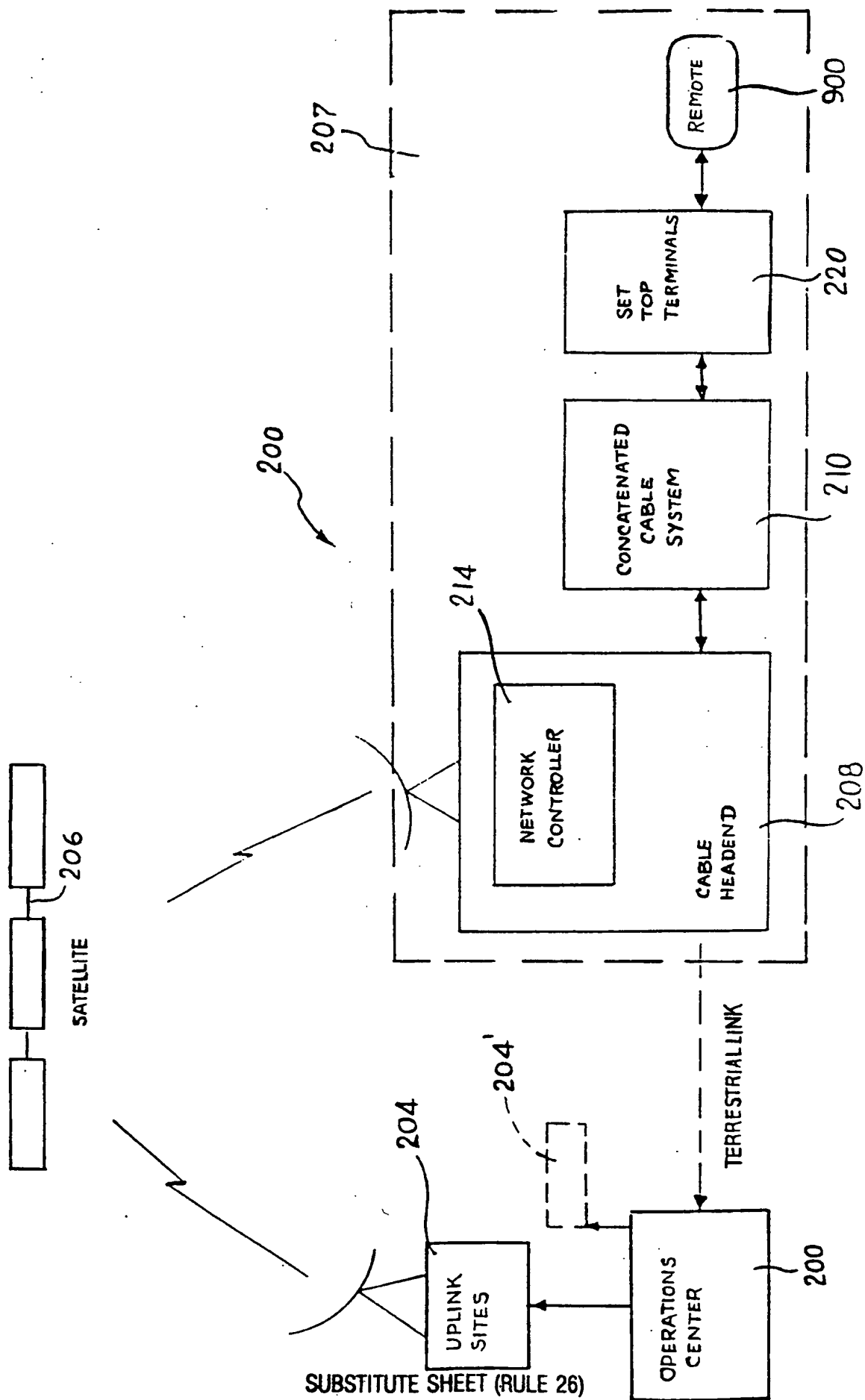


Fig. 1

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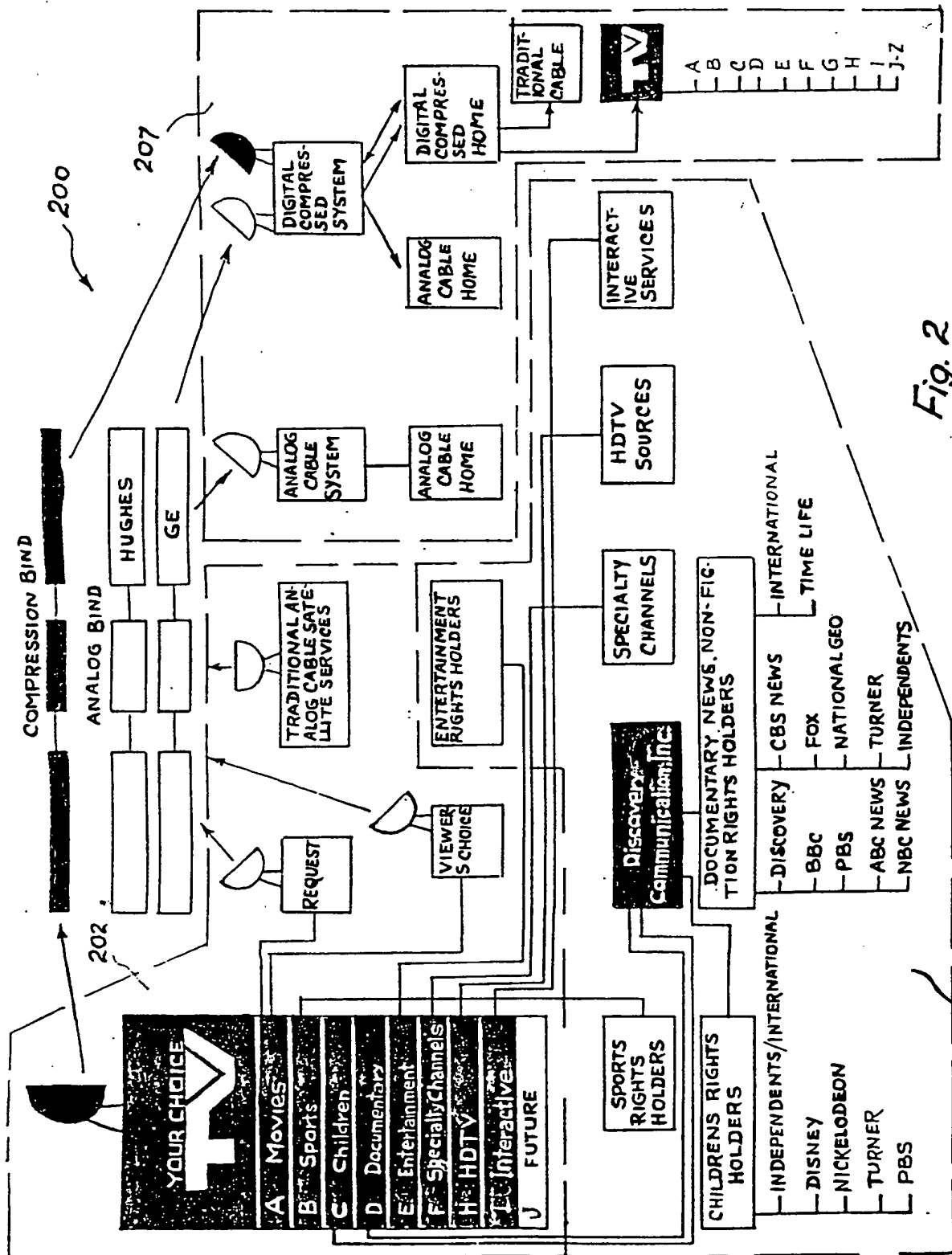


Fig. 2

212

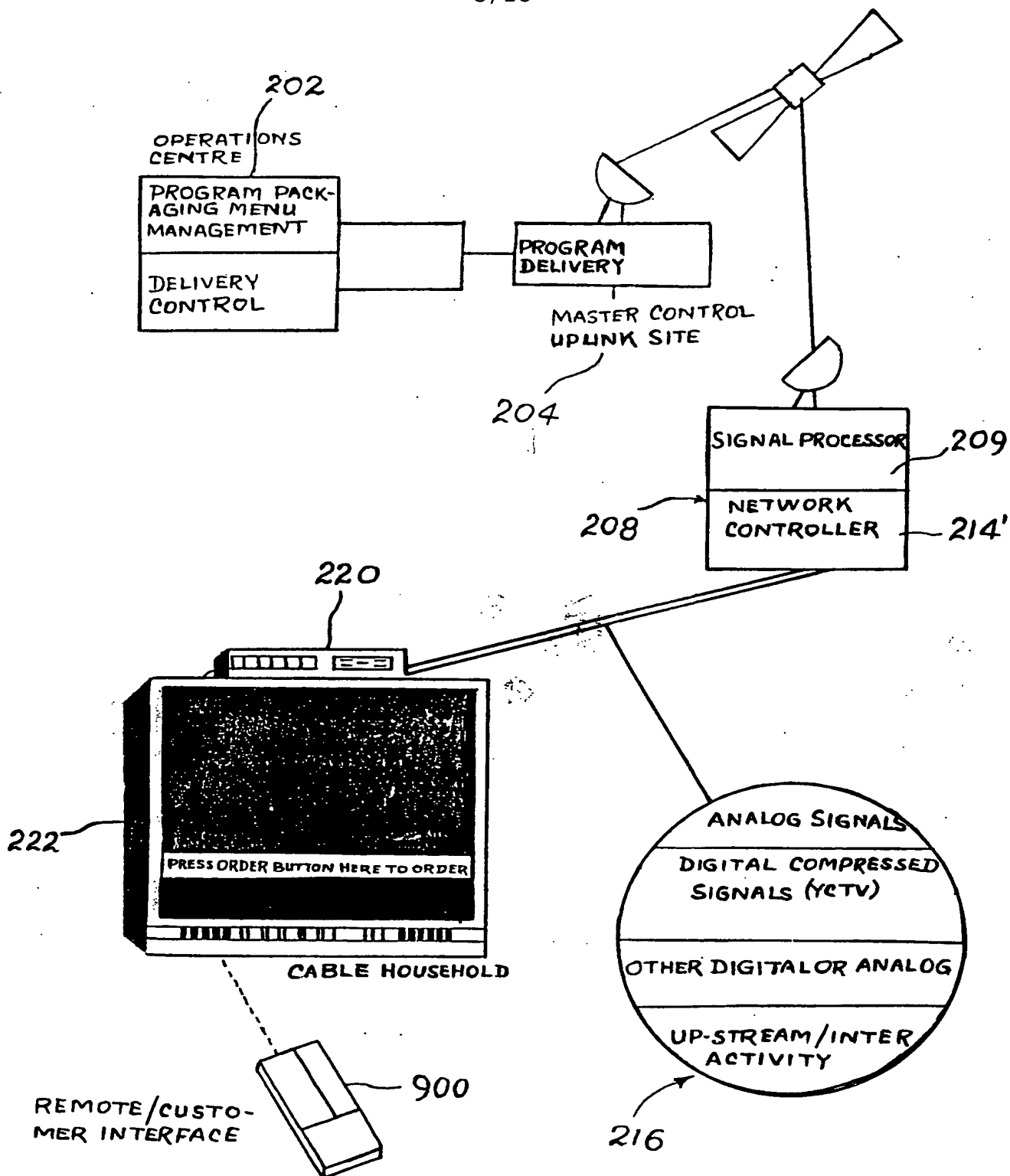


Fig. 3

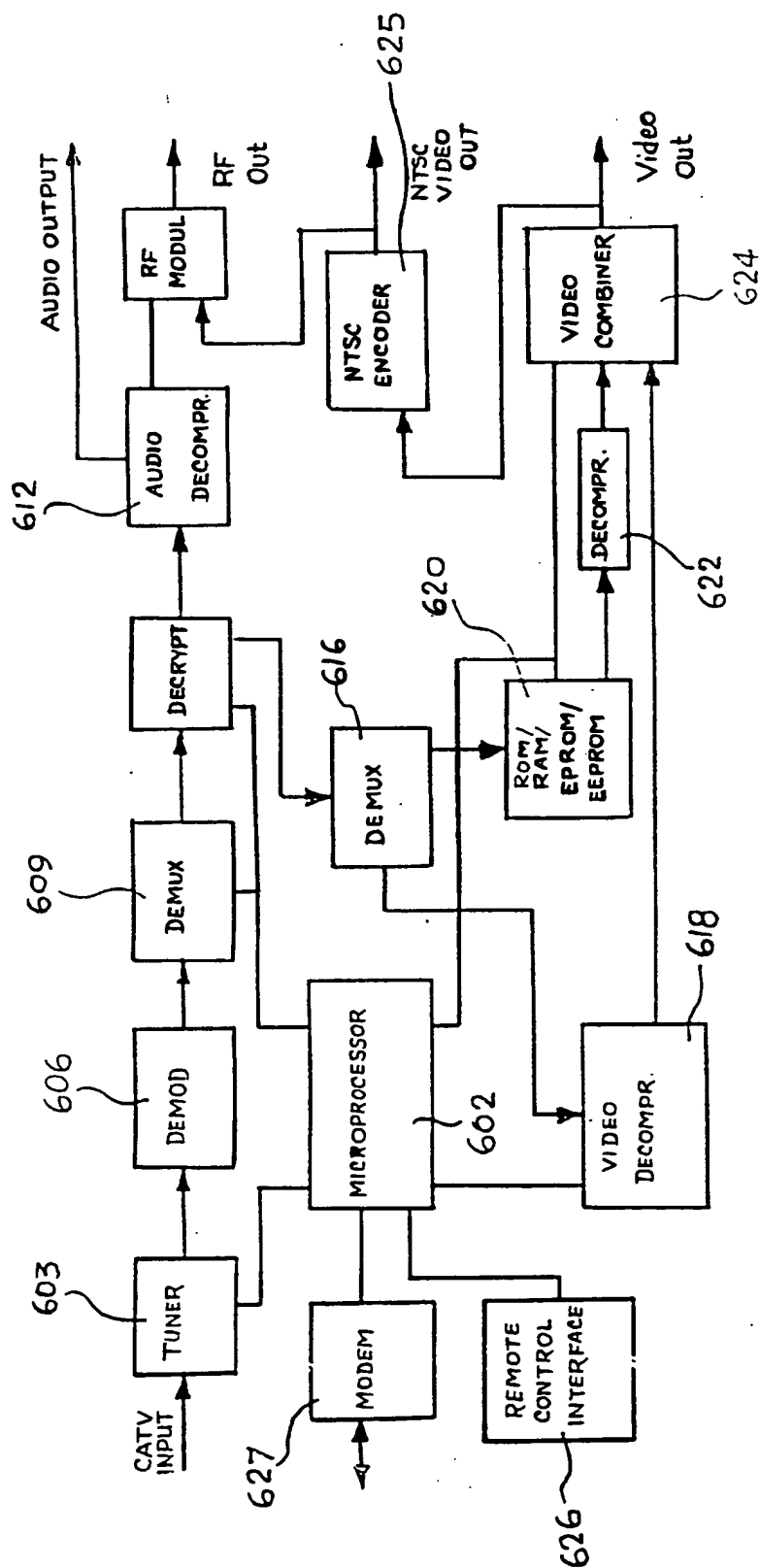


Fig. 4

220



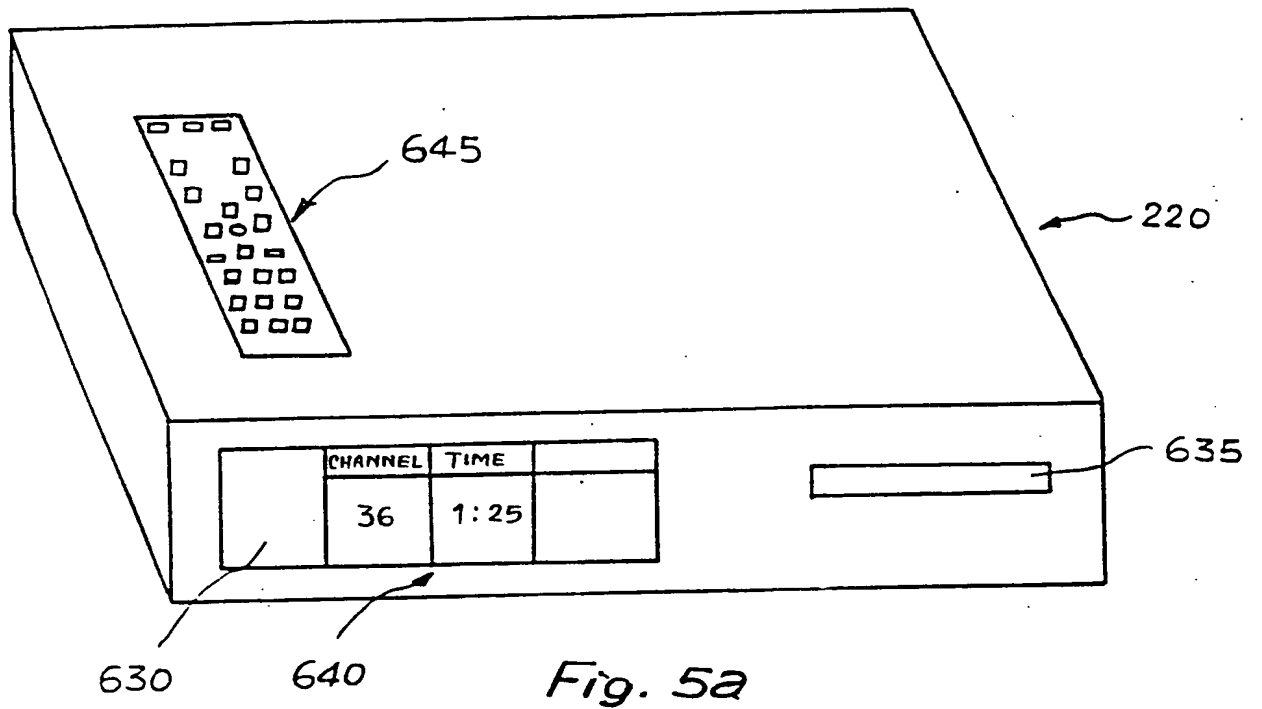
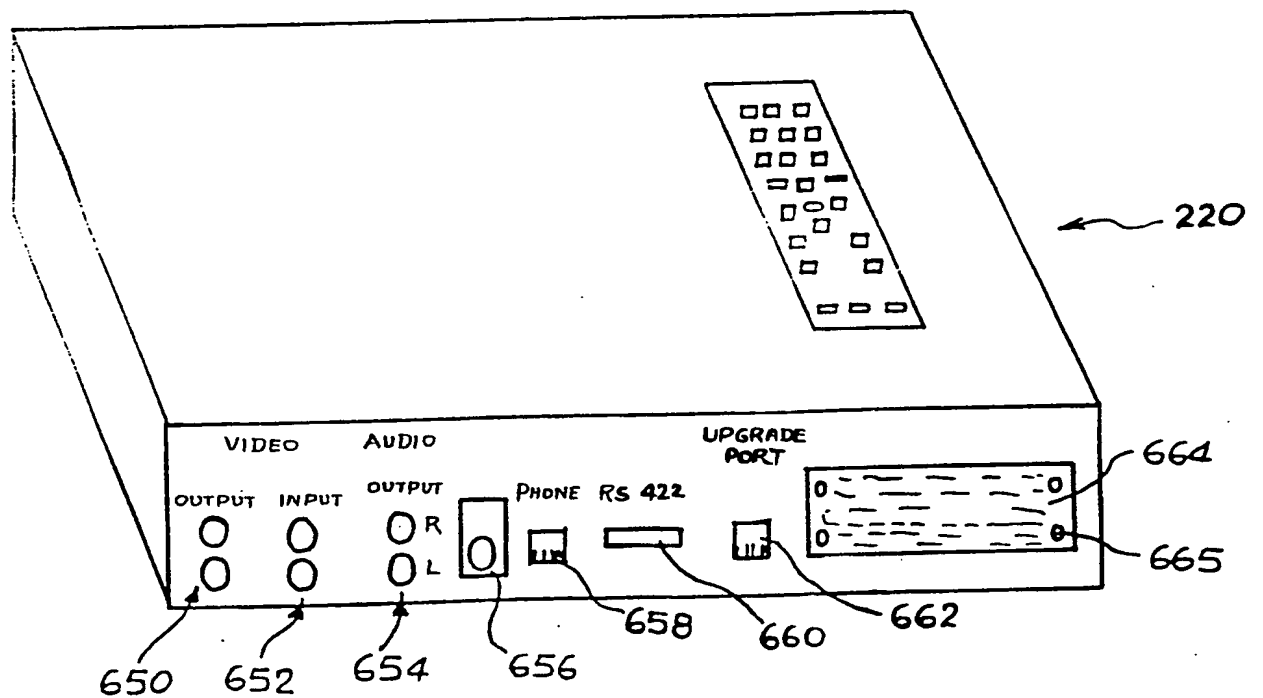


Fig. 5b



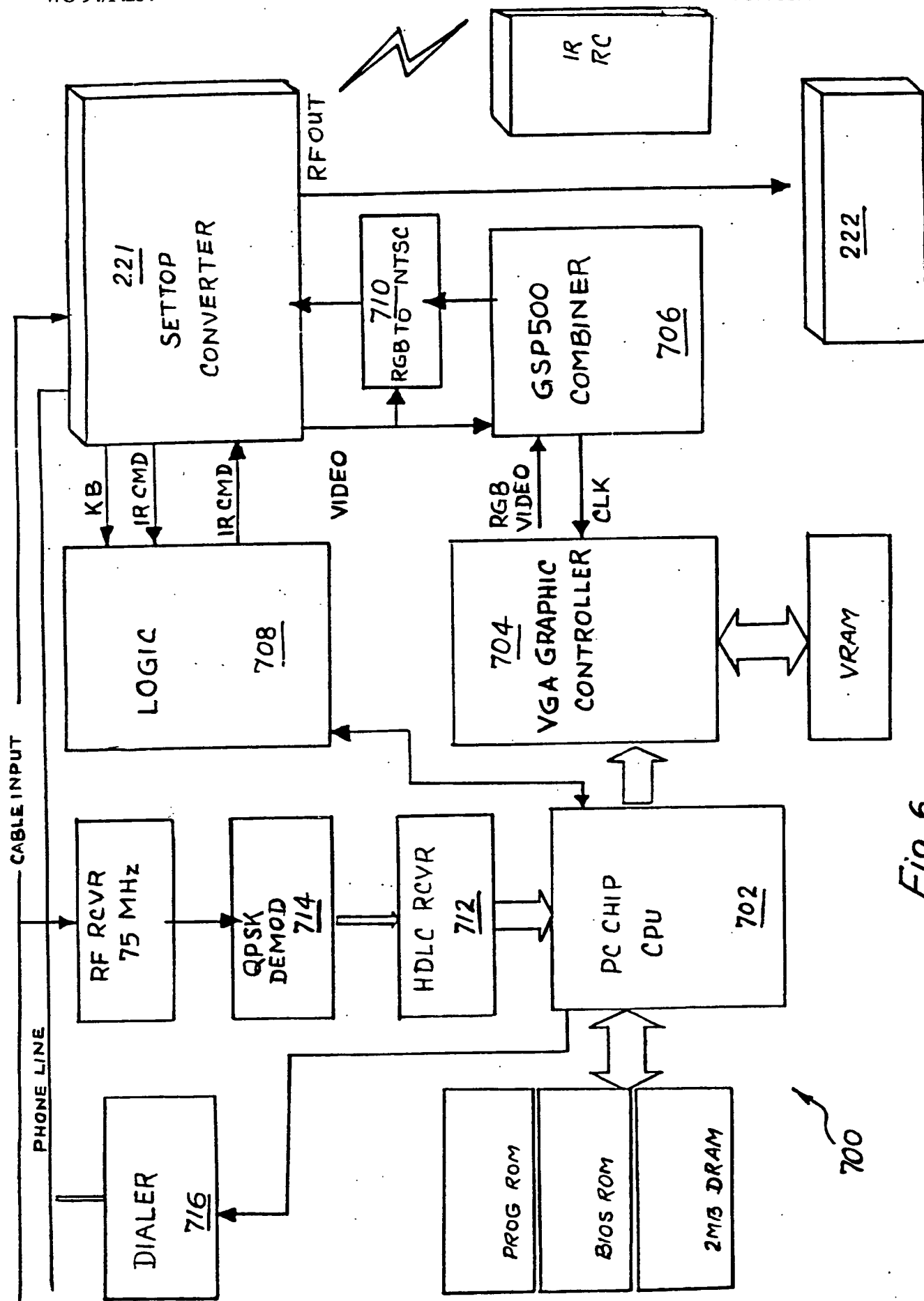
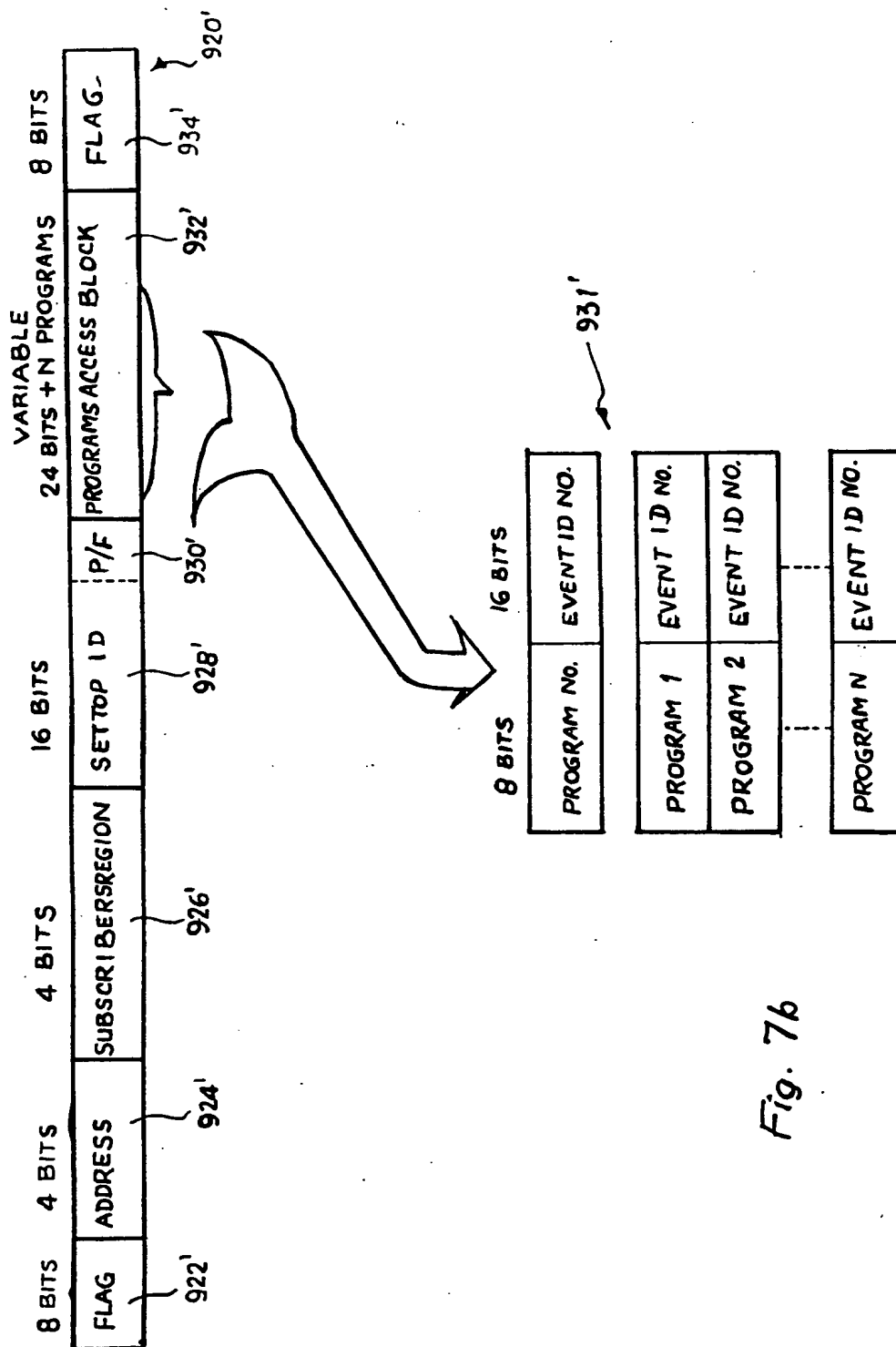
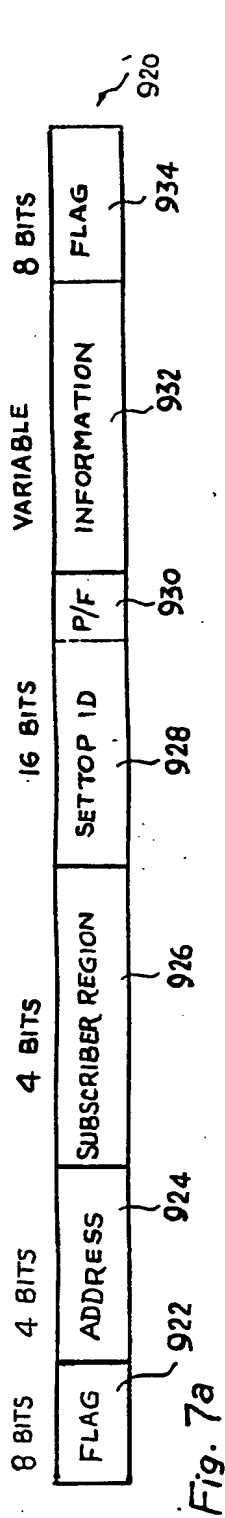
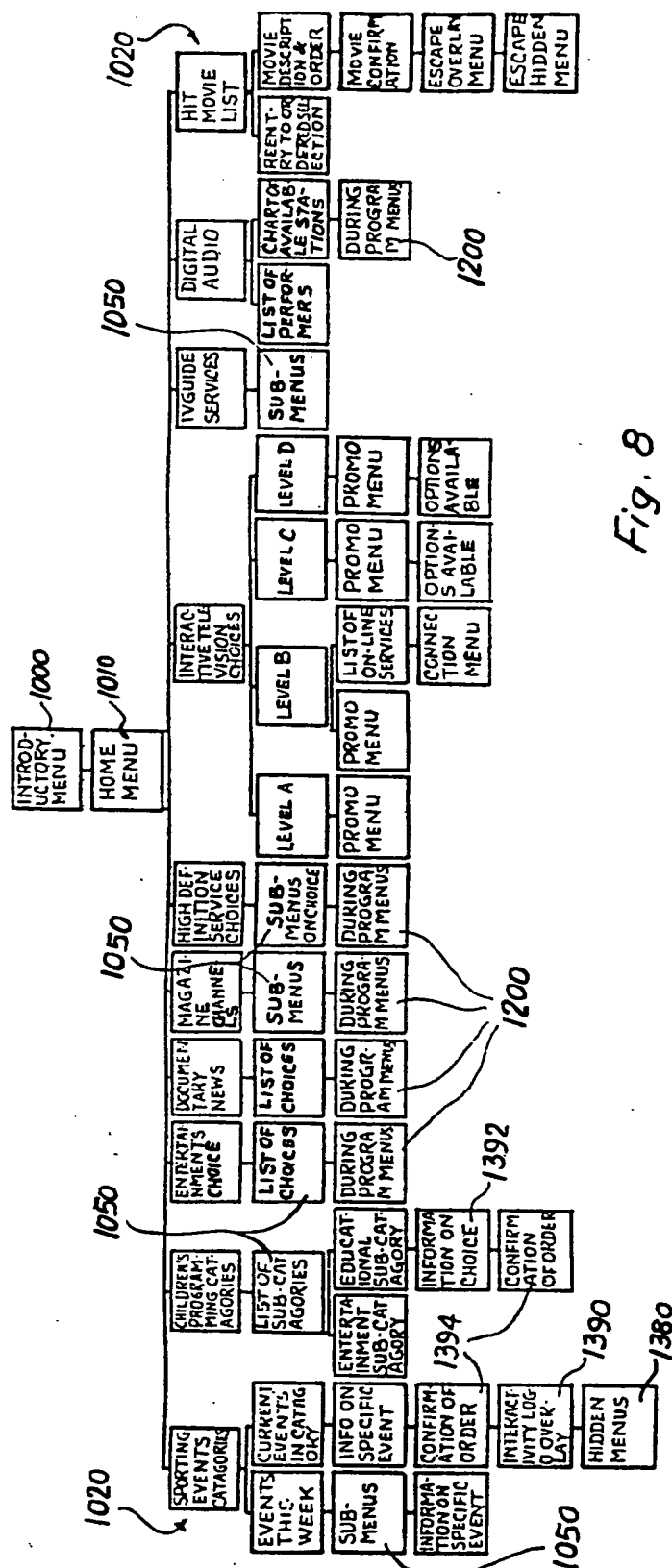


Fig. 6





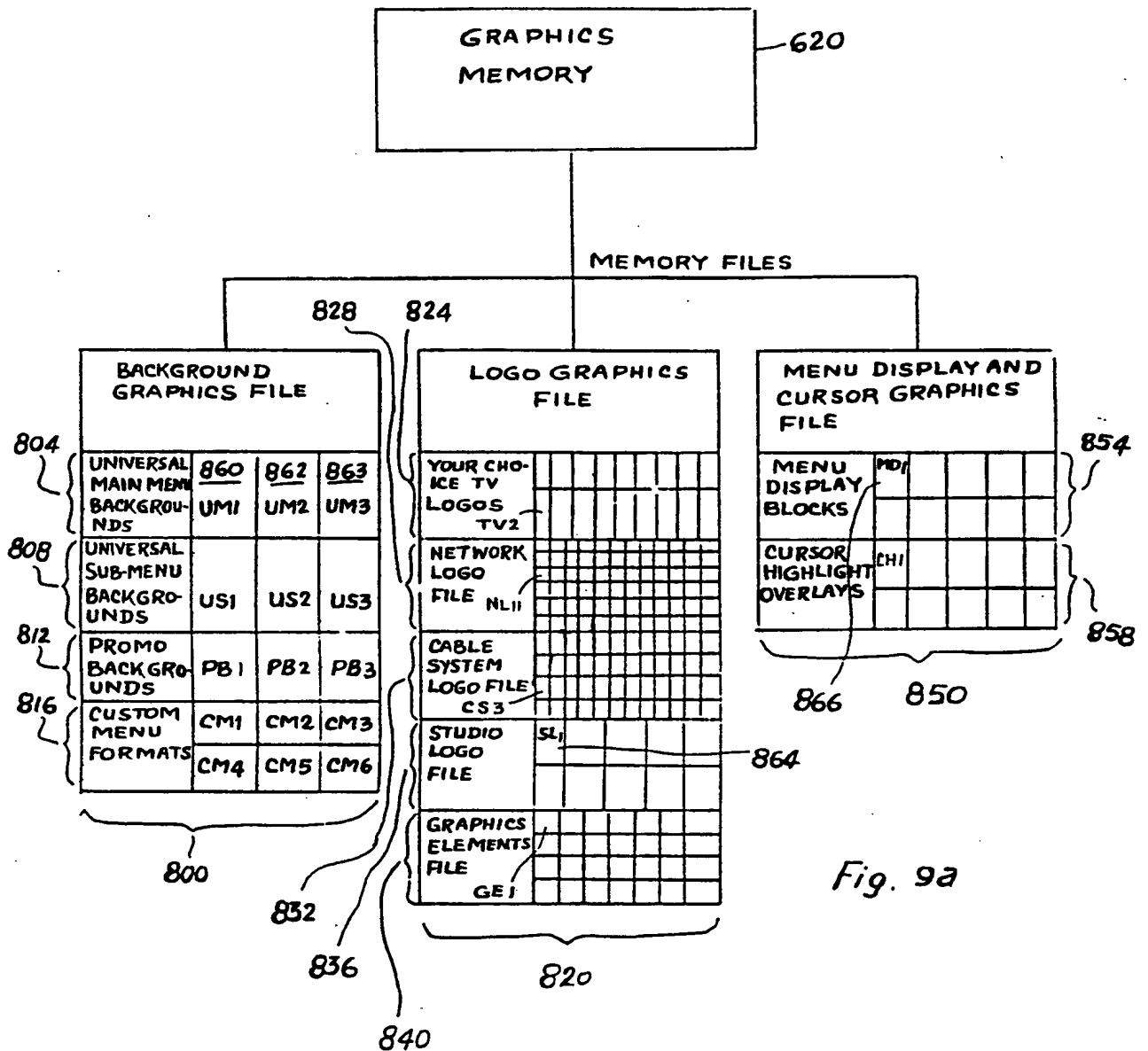
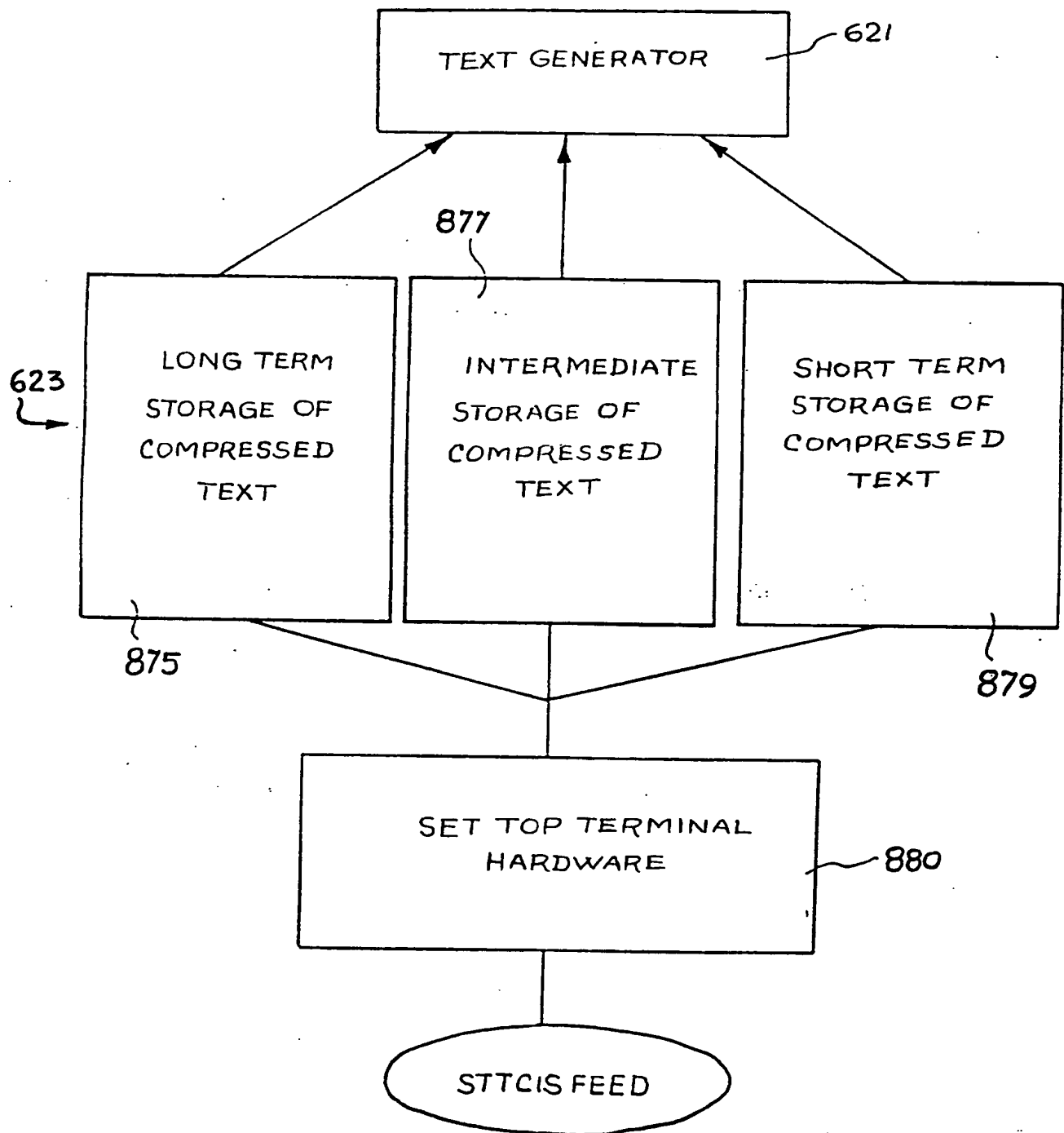
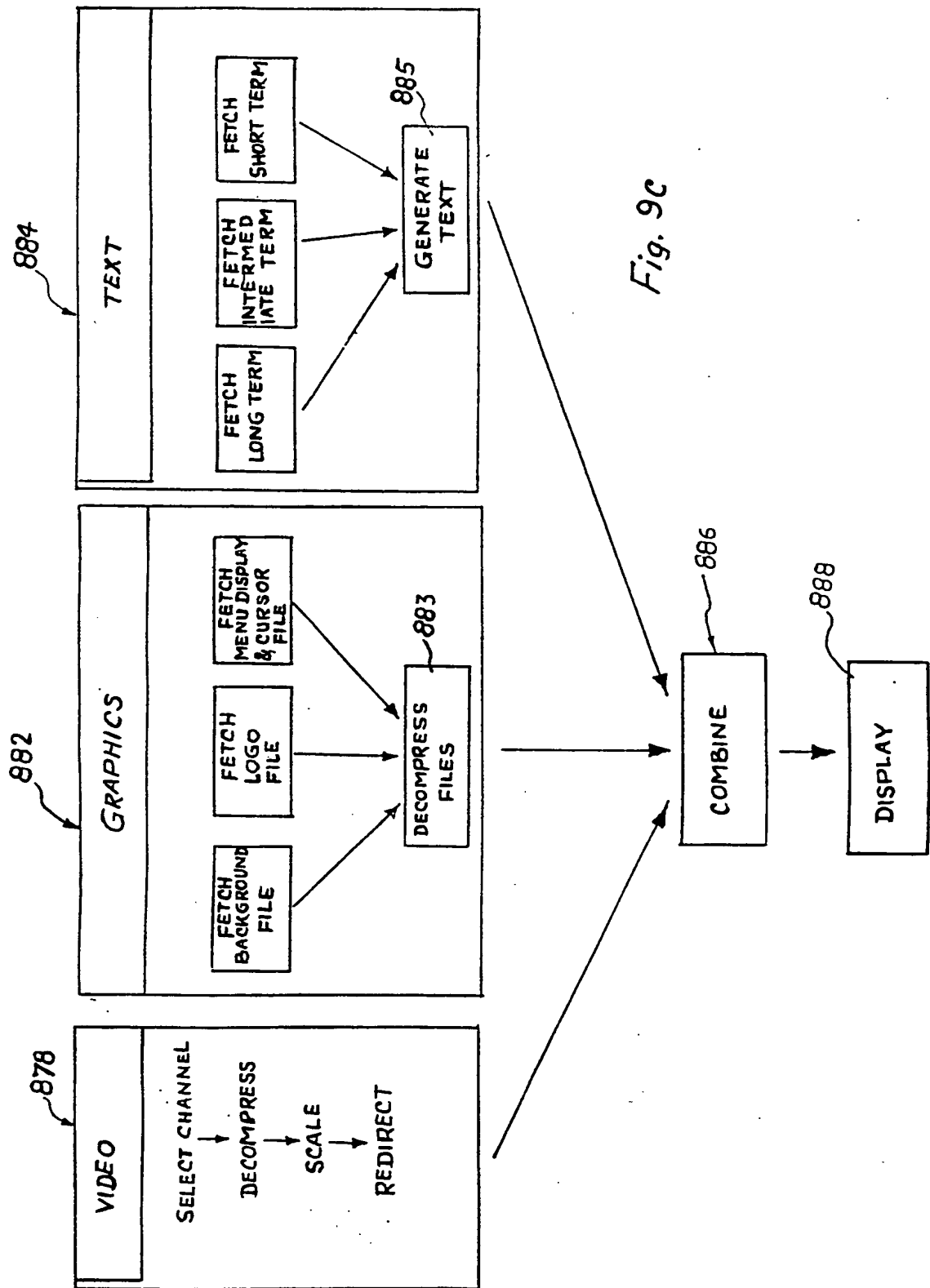
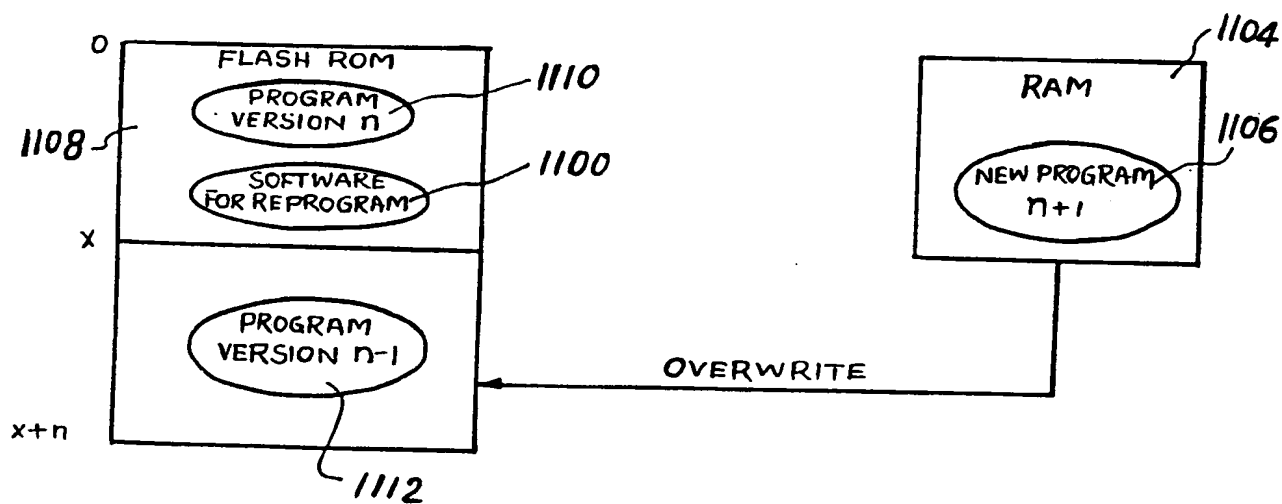
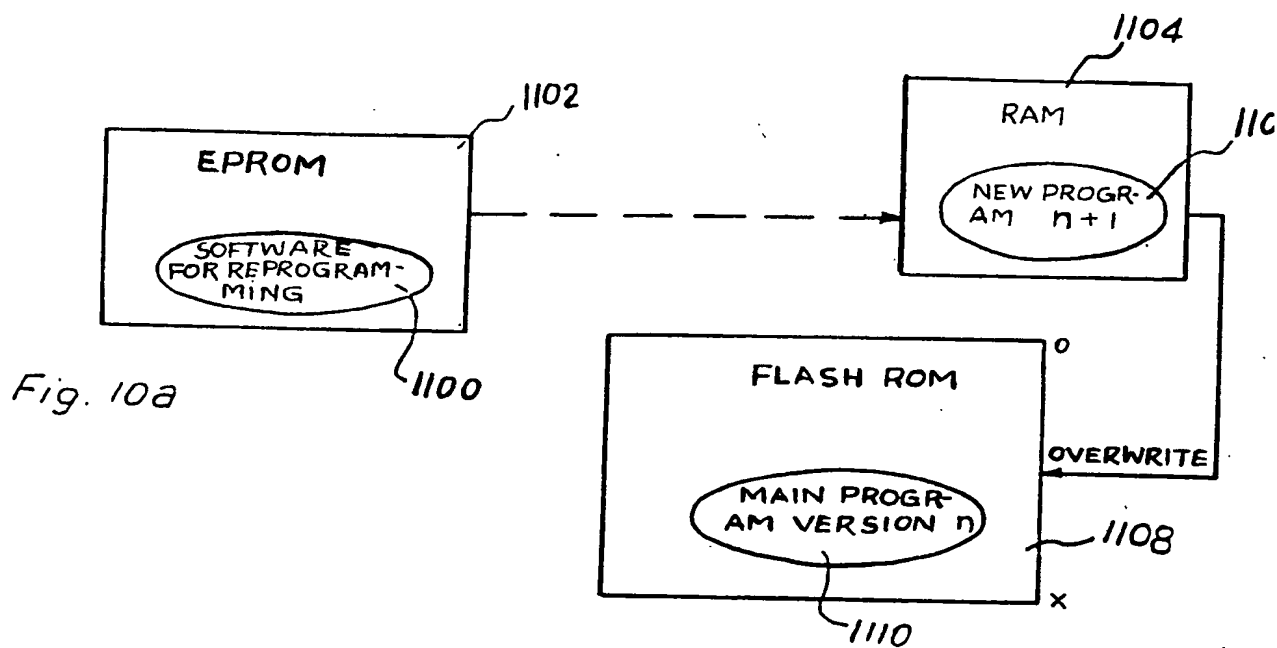


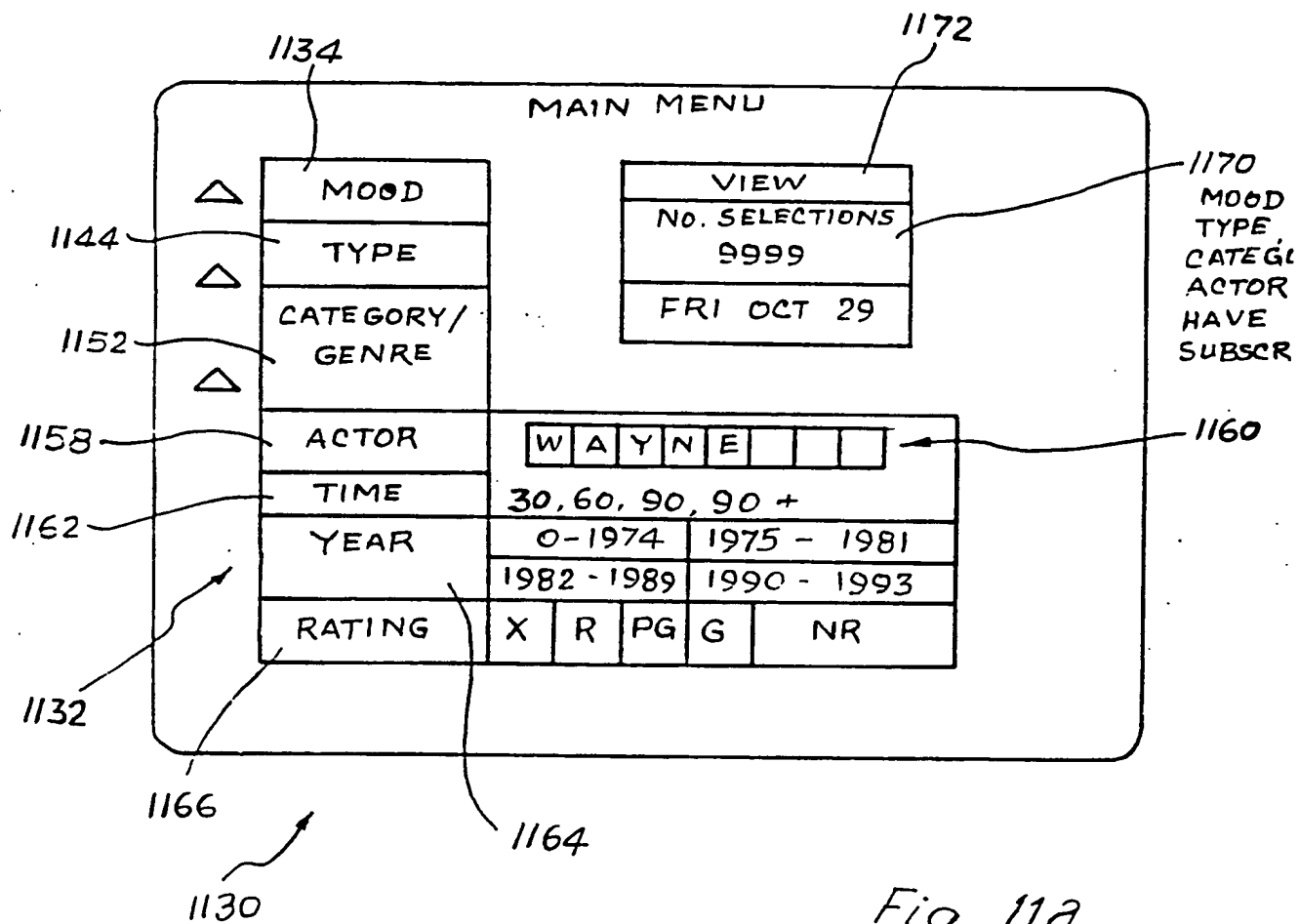
Fig. 9a

*Fig. 9b*









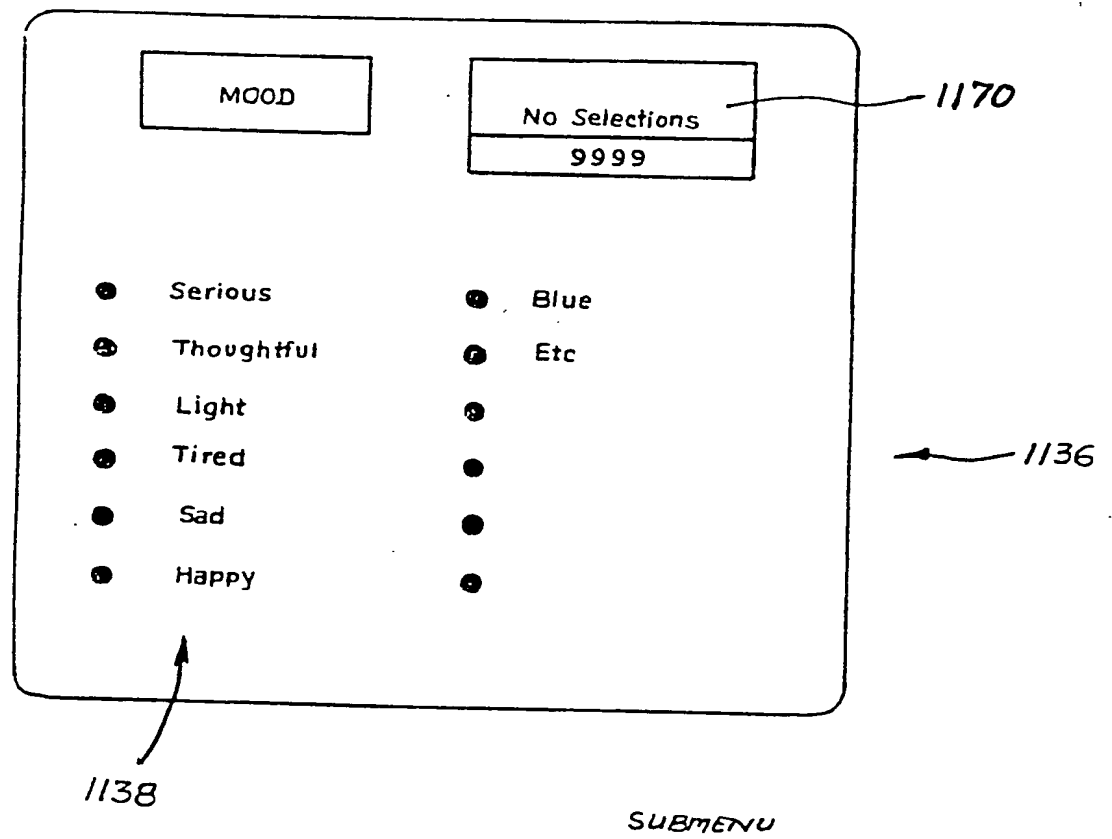
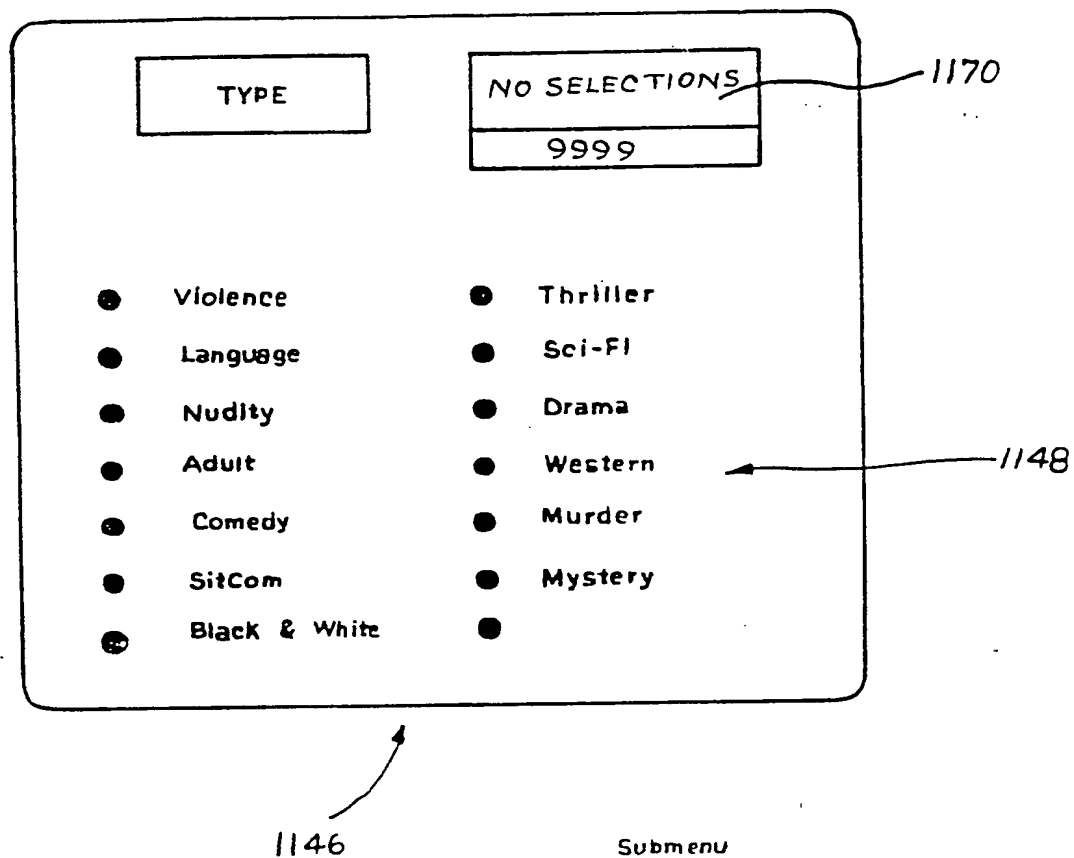


Fig. 11b

*Fig. 11c*

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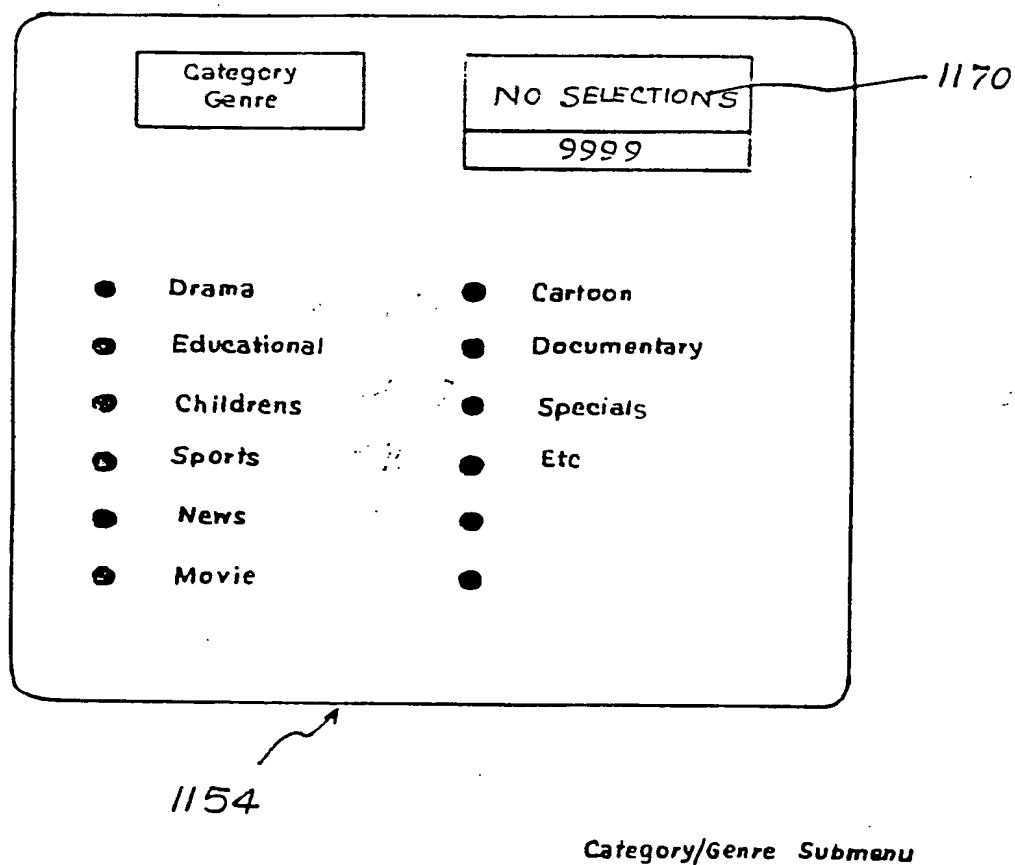


Fig. 11d

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Selection List

1. True Grit
2. Green Berets ▲
3. Rooster Cogburn
4. The Alamo
5. Fort Apache
6. Red River
7. Rio Bravo
8. She Wore A Yellow Ribbon
9. Stagecoach
10. West Of The Divide

MORE ▼

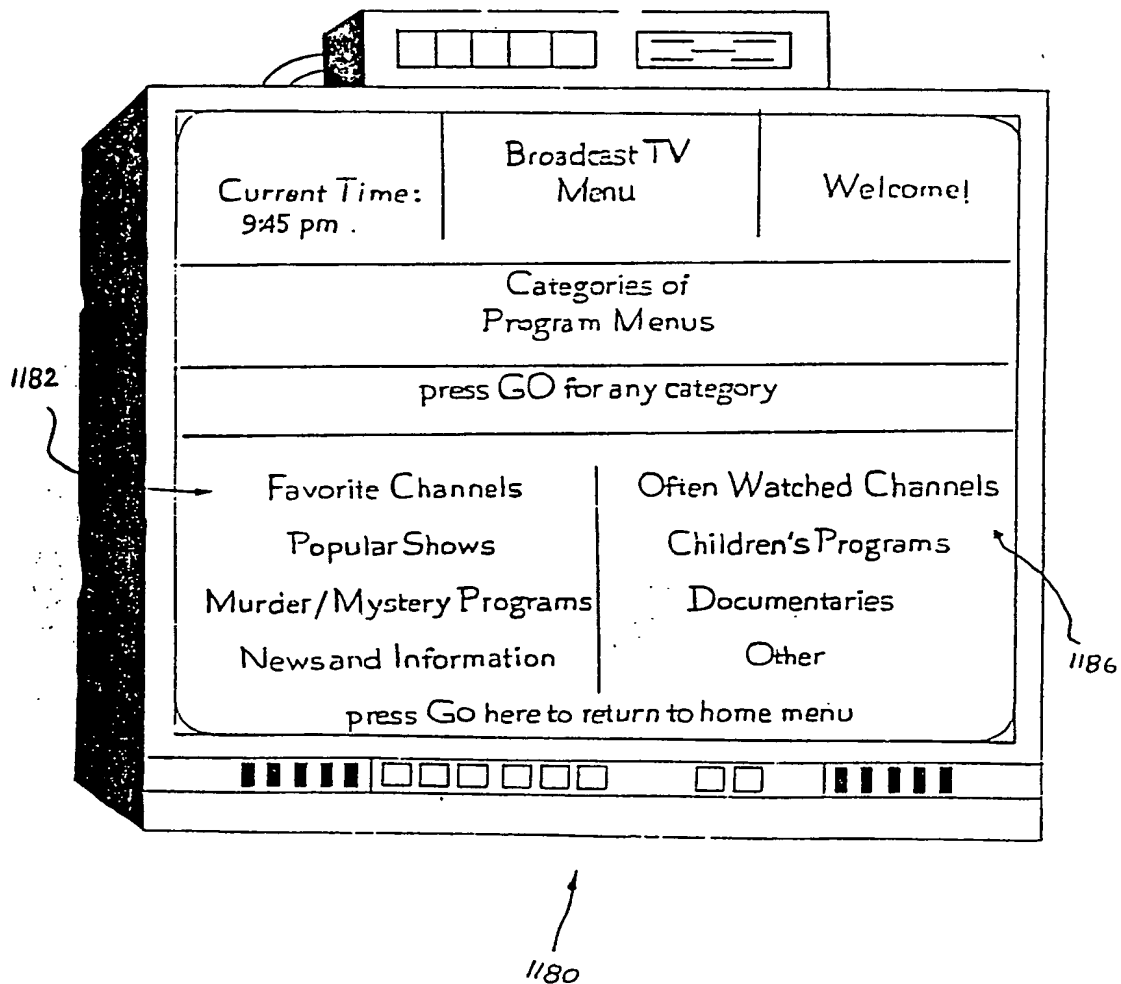
Return To Main Menu

1174

1176

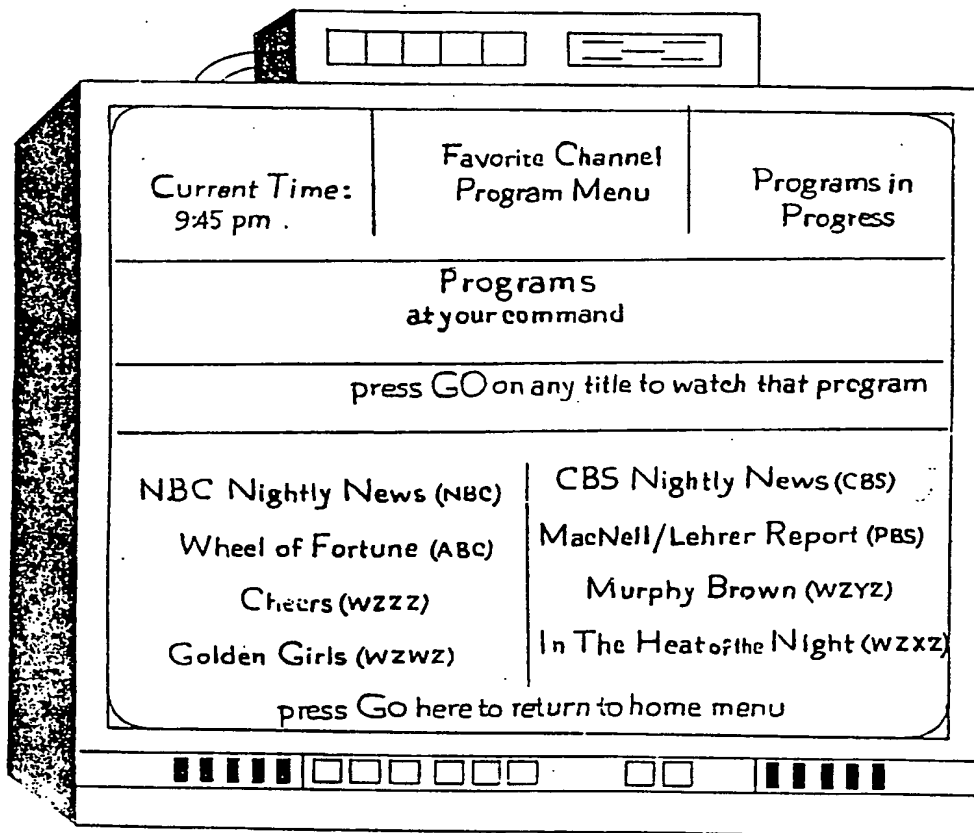
Fig. 11e

Fig. 12a



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Fig. 12b



1184

## MOOD QUESTION MENUS

1190

LENGTH OF PROGRAM DESIRED

Short

Medium

Long

*Fig. 12c*

1192

Type of Program Desired

Serious

Thoughtful

Light

*Fig. 12d*

1194

Do you wish an active or passive program?

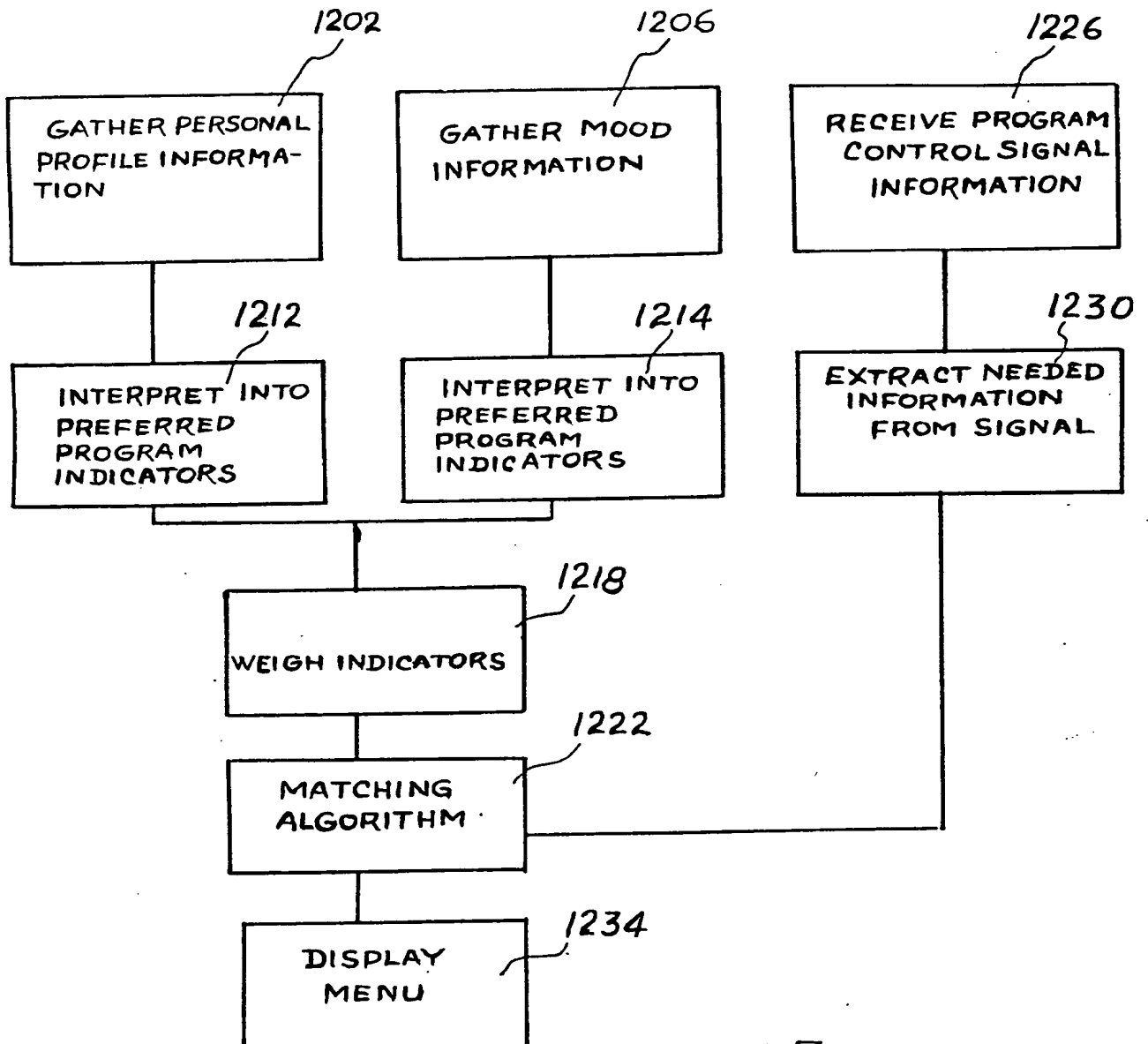
Active

Passive

*Fig. 12e*



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*Fig. 13a*

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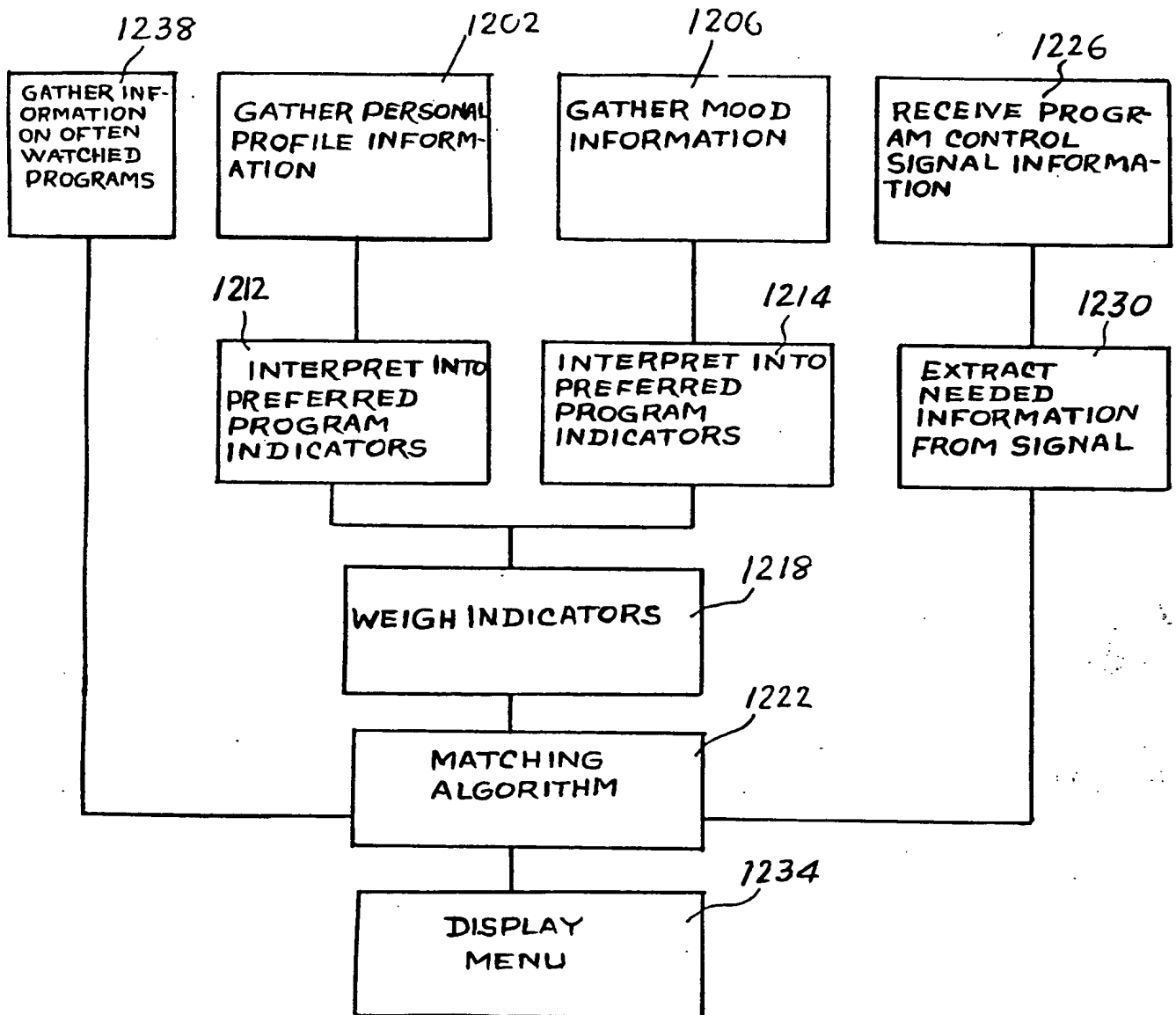
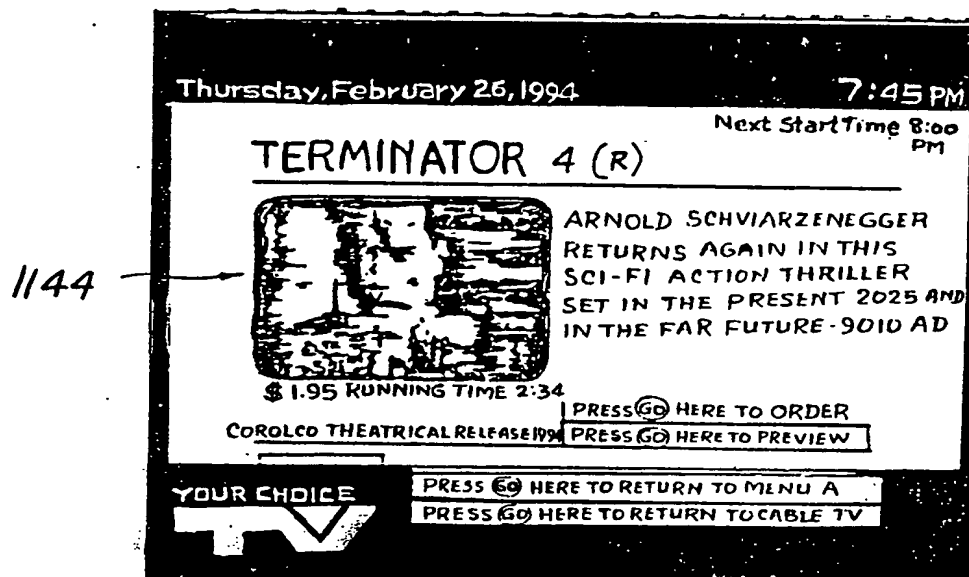


Fig. 13b

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Fig. 14



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## INTERNATIONAL SEARCH REPORT

Internat. J. Application No.

PCT/US 93/11708

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 5 H04N7/16 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 H04N H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	WO,A,92 17027 (SCIENTIFIC-ATLANTA) 1 October 1992  see the whole document	1,7,9, 16,17, 19-23,32 2-6,8, 10-15, 18,24-31
Y A	WO,A,91 00670 (THE SUPERGUIDE CORP.) 10 January 1991  see the whole document	1,7,9, 16,17, 19-23,32 2-6,8, 10-15, 18,24-31
A	EP,A,0 424 648 (GENERAL INSTRUMENT) 2 May 1991 see abstract	17-19

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

25 May 1994

Date of mailing of the international search report

06.06.94

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Greve, M

## INTERNATIONAL SEARCH REPORT

Internat J Application No  
PCT/US 93/11708

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 506 435 (SCIENTIFIC-ATLANTA) 30 September 1992 see page 14, line 55 - page 15, line 50 ---	22
A	BYTE February 1991 , ST.PETERBOROUGH, US pages 251 - 258 J.REIMER 'MEMORIES IN MY POCKET' see the whole document ---	23-29
A	EP,A,0 402 809 (MAGUS, LTD.) 19 December 1990 see column 4, line 48 - column 11, line 39 ---	1-32
A	WO,A,86 01962 (SCIENTIFIC-ATLANTA) 27 March 1986 see the whole document -----	1-32

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Information on patent family members

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		US-A-	4829569	09-05-89
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(54) Title: METHOD AND APPARATUS FOR PROVIDING INTERACTIVE ELECTRONIC PROGRAMMING GUIDE			
<pre> graph TD     10[CENTRAL CONTROL CENTER] --- 12[CABLE HEADEND]     12 --- 16[ELECTRONIC PROGRAMMING GUIDE DATA PROVIDER]     12 --- 14[SUBSCRIBER TERMINAL]       </pre>			
(57) Abstract  A subscription television system is provided that transmits a plurality of television signals to a plurality of subscribers. The television signals include pay-per-view programs (purchased by feature) or near-video-on-demand programs (purchased for a period of time for unlimited viewing) that are provided only to subscribers that purchase the programs. Data (16) representing an electronic programming guide is also transmitted. The electronic programming guide can be displayed by a subscriber terminal at the subscriber's location. The electronic programming guide is a grid (Fig. 4A and 4B) listing television programs by date, time and channel. A subscriber can select programs for watching or recording from the electronic program guide. Moreover, the subscriber can purchase pay-per-view or near-video-on-demand programs from the electronic programming guide.			

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**METHOD AND APPARATUS FOR PROVIDING  
INTERACTIVE ELECTRONIC PROGRAMMING GUIDE**

This application is a continuation-in-part of Application Serial No. 07/983,910, entitled "Subscriber Terminal With A Plug In Expansion Card", filed December 1, 1992 and Application Serial No. 989,909, entitled "Reprogrammable Subscriber Terminal", filed December 1, 1992.

**BACKGROUND OF THE INVENTION**

**A. Related Application**

This application is related by subject matter to Application Serial No. \_\_\_\_, entitled "Subscription Television System and Terminal for Enabling Simultaneous Display of Multiple Services" (attorney docket no. 1263.45910) and Application Serial No. \_\_\_\_, entitled "System and Method for Providing Subscriber-Interactivity in a Television System (attorney docket no. 1263.45816), both filed April 19, 1994.

### **B. Technical Field**

This application relates to the field of subscription television systems, and more particularly, to providing an electronic program schedule to a user of a subscription television system, and allowing the user to select programs, including pay-per-view or video-on-demand programs, directly from the electronic program schedule.

### **C. Description of the Relevant Art**

Cable, satellite, and over-the-air subscription television systems, generally referred to herein as subscription television systems, are known. Relatively recently, pay-per-view events were added as available choices on many subscription television systems. These events are available for purchase individually for a fee. The user selects the event, and there is a charge assessed against his account. The subscriber's equipment (normally referred to as a subscriber terminal or set top terminal) then tunes the event and performs any necessary descrambling. The user is then able to view the event.

In order to view a program, the subscriber must inform his service provider that he wishes to view the program. In many prior art systems, this has been complicated and inconvenient for the subscriber. In early systems, it was necessary for the subscriber to either mail a card or telephone the provider well in advance of the event and request that his terminal be authorized to view the event. This required significant preparation on the part of the subscriber. Unless the event was of very special interest to the subscriber, he was unlikely to engage in such preparation. Further, such systems did not provide for persons who, for

example, found themselves unexpectedly home on a given night, and wanted to watch a pay-per-view movie. Responding to dissatisfaction over such systems, providers have more recently offered more sophisticated telephone authorization services, requiring a minimum of preparation time and/or cable return authorization services. Also, so-called impulse-pay-per-view systems have been introduced that allow a subscriber to choose an event directly from his subscriber terminal for immediate viewing.

However, even with the sophisticated phone authorization systems or impulse-pay-per-view systems, choosing a pay-per-view event has not proved to be a simple matter. With the phone authorization systems, the user must know a telephone number to call. He must then enter a series of seemingly meaningless numbers indicating the program choice, a customer identification number, and typically, a security number of some sort. With impulse-pay-per-view systems, the user must frequently work his way through long menus and also enter event codes and security numbers. The problem with such systems is that users are often intimidated by them. Many of the subscribers are unsophisticated and find it difficult to remember the steps necessary to purchase the events. Other subscribers are recalcitrant and unwilling to learn the complex steps required for pay-per-view operations. Such users do not purchase pay-per-view events, and accordingly, reduce the revenue the service provider would otherwise obtain. Moreover, these complicated systems have a degenerative effect because the subscribers become frustrated with their systems and in the future are unwilling to try new services offered by the cable company, dismissing them as too complex.

As with all services provided on a fee basis, there is a drive in the industry to make purchase of pay-per-view events as easy as possible.

Recently, some companies have begun offering electronic television schedules for purchase by subscription television providers, who, in turn, provide the schedules to their customers. The schedules contain a listing of television programs by time and channel, and are typically displayed as a grid on the television screen. Such a system is shown in PCT Publication No. WO 92/04801, applied for by Insight Telecast, Inc. (hereinafter "the Insight system"). That publication describes a display system for maneuvering a cursor through a television schedule. The system also describes that a subscriber can choose a program for recording by moving a cursor to the selected program; the system will automatically program the customer's video cassette recorder. The Insight system provides week-long television schedule information. That information is downloaded into a subscriber terminal for use by the subscriber. Accordingly, the subscriber terminal must have significant memory. Further, most users of the guide are not seeking information one week in advance of the broadcast. The significant memory expense imposed by the Insight system is frequently not justified by the extra performance allowed by the one-week display.

Also recently, so-called near-video-on-demand services have been introduced. These services provide a simulation of the videotape rental experience. One such system is described in Walter, U.S. Patent No. 5,168,353. Walker describes in column 4, lines 18-27 that a converter may be enabled to descramble two channels carrying the same program at staggered intervals. This allows returning to the same portion of the video after a pause equal to the

staggered time interval. The Walker patent gives as an example a subscriber ordering a program that begins at 8:00 p.m. The converter unscrambles the 8:00 showing as well as the 8:15 showing so that the viewer may return to the same point in the program after a fifteen minute break. However, if the near-video-on-demand feature is to effectively compete with video rental stores, it must have additional features such as multiple pause features, rewind features and fast-forward features. In addition, the subscriber should find such a service to be user-friendly and easy to use.

### **SUMMARY OF THE INVENTION**

In accordance with the invention, a television system is provided that includes an electronic program guide giving a schedule of programs available on the television system, including pay-per-view and video-on-demand programs. The user may select programs for watching or recording directly from the electronic program guide. The selected programs may include pay-per-view and video-on-demand programs, which may be purchased directly from the guide. The programs may be purchased without entry of event codes or the like. Near video-on-demand features may be purchased for finite periods of time, and allow pause, rewind and fast-forward functions.

In another preferred embodiment of the invention, the program schedule information is obtained from a data provider specializing in providing that information, such as Insight Telecast, Inc. The headend then selects portions of that data for transmission to the subscribers. The headend can select portions to satisfy the needs of its subscribers taking into consideration other factors, such as

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terminal costs. The headend may also reformat the data in such a way as to provide it in a more useful format to its subscribers or add additional information of special interest to its subscribers.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a block diagram of a subscription television system in accordance with the invention.

Figure 2 is a detailed block diagram of a subscription television system in accordance with the invention.

Figure 3 is a block diagram of a decoder in accordance with the invention.

Figure 4A is a screen illustrating an electronic programming guide in accordance with the invention.

Figure 4B illustrates the loading of the subscriber terminal memory with electronic programming guide data.

Figure 5 is a screen illustrating an electronic programming guide in accordance with the invention, including time, channel and program data highlighted.

Figure 6 is a screen illustrating an electronic programming guide displaying a pay-per-view event in accordance with the invention.

Figures 7 and 8 illustrate a purchase sequence for a pay-per-view event in accordance with the invention.

Figure 9 illustrates an informational screen for a subscription television event in accordance with the invention.

Figure 10 illustrates a channel listing for a subscription television system in accordance with the invention.

Figure 11 illustrates a favorite channel list for a subscription television system in accordance with the invention.

Figure 12 illustrates a confirmation screen for use with a favorite channel list in a subscription television system in accordance with the invention.

Figures 13-17A illustrate a purchase sequence for a near-video-on-demand feature of a subscription television system in accordance with the invention.

Figure 17B illustrates a pause sequence for a near-video-on-demand feature of a subscription television system in accordance with the invention.

Figure 18 and 19 illustrate pay-per-view selection options in a subscription television system in accordance with the invention.

Figures 20 and 21 illustrate a purchased pay-per-view events review option in a subscription television system in accordance with the invention.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Figure 1 shows a generalized block diagram of a subscription television system according to the instant invention. The system of Figure 1 is for example only and should not be construed as limiting the invention. A central control center 10 orchestrates the operation of the subscription television system. Central control center 10 is often associated with the central office of a multi-service operator and may communicate with and control headends in many cities. Headend 12 provides subscription service to a local area, e.g., one city or a region including one or more cities or towns. A subscriber terminal 14 is also shown and

would be located in a subscriber's home or business. Of course, in a typical subscription television system, there would be hundreds or thousands of such subscriber terminals. Finally, an electronic programming guide data provider 16 is shown. Electronic programming guide data provider 16 supplies television schedule information to headend 12. The lines connecting central control center 10 to headend 12 and electronic programming guide data provider 16 to headend 12 indicate communication paths. Data may be communicated along those paths by any known means including telephone networks, satellite transmissions, optical fibers or other transmission lines, etc. A distribution system connects headend 12 to each subscriber terminal 14. Frequently, the distribution system consists of transmission lines and line extenders, but may include coaxial cables, optical fibers, satellite uplinks and downlinks, other broadband transmission paths and combinations thereof.

Figure 2 is a more detailed diagram of the system shown in Figure 1. On the left side of the dotted line is shown electronic programming guide ("EPG") data provider 16 and central control center 10. In the center portion of Figure 2 is shown headend 12 in detail. Finally, in the right portion of Figure 2 is shown a subscriber terminal 14 and associated equipment (VCR 18 and television 20).

In this preferred embodiment the EPG data provider 16 transmits EPG data by satellite to headend 12. This data includes program information arranged by time and channel. One such service is offered by Insight Telecast Inc. The Insight service provides extensive television program listings. Subscription television system operators can purchase this data and provide it to their subscribers.



Central control center 10 includes a system manager 22 that directs the other components of central control center 10. One example of a system manager 22 is Scientific-Atlanta's System Manager 10 network controller. Central control center 10 may, for example, provide billing services for the provider, including billing for pay-per-view events. A billing computer 24 stores billing data and may also format and print bills. Modems 26 and 38 allow data transmissions between system manager 22 and headend controller ("HEC") 28. For example, authorization data may be transmitted from system manager 22 to HEC 28. HEC 28 formats the authorization data and transmits it to subscriber terminals either in-band through scramblers 48, 50 or 52 or out-of-band through outband data transmitter 54. HEC 28 may conveniently comprise a Scientific-Atlanta Model 8658 for controlling transmission of data streams to scramblers 48, 50, 52 and outband transmitter 54. Billing data from the subscribers can be received through either phone processor 30 or modem 32. Subscriber terminal 14 can either transmit billing data over a telephone line directly to the phone processor 30 or back up the cable to RF IPPV processor 34, depending on its configuration. Subscriber terminal 14 can either include a phone communication module or an RF communication module, which is used to transmit the billing data. If the data is sent to RF IPPV processor 34, it is sent by modem 36 associated with RF IPPV processor 34 to modem 32 associated with system manager 22. System manager 22 accumulates the billing data from phone processor 30 and modem 32 and provides it to billing computer 24 so that customers may be billed for their program services.

Turning now to headend 12, the EPG data is received by a satellite receiver 40 and passed to information service processor 42. Information service processor ("ISP") 42 may also receive text data for transmission to subscribers. The text data may include weather information, sports scores, messages, etc. and may be provided by an information service provider or generated by the cable provider. ISP 42 is responsible for receiving the EPG data well as the other data, and transmitting it to the subscribers. ISP 42 provides data to scramblers 44 and 46. Of course, the actual number of scramblers to which the ISP provides data would depend on many factors, including the amount of data to be transmitted and the speed at which the data must be supplied and updated. The EPG and text data is repetitively sent out by the scramblers. If there is only one scrambler, and a lot of such data, the repetition rate will be slow. Use of more than one scrambler allow the data repetition rate to increase. The two scramblers 44 and 46 in Figure 2 are for example only.

Scramblers 44 and 46 place data in-band for transmission to subscribers, along with scrambling an associated television signal. The EPG data and text data in a preferred embodiment are placed in the vertical blanking interval, but may also be placed elsewhere in the 6 MHz channel. For example, data could be amplitude modulated on sound carrier as in known in the prior art. Herein a 6 MHz NTSC analog television signal is considered by way of example but the invention should not be so limited. The television signal may be in PAL or SECAM format, digital or digitally compressed data or may comprise a wider bandwidth high definition television signal. As herein described, in-band transmission means the transmission of data within the video television channel

comprising both audio and video carriers. The data may be transmitted by amplitude modulation on the sound carrier, hereinafter in-band audio data or in the video signal during unused portions such as data channels of an MPEG compressed video data stream or the vertical or horizontal blanking periods of an analog television signal.

The EPG data received by satellite receiver 40 will often be very extensive, containing data for programs up to one or two weeks in advance. If all this data is to be transmitted to subscriber terminal 14, the terminal must be able to store the data in its memory. To store that much information requires a significant amount of memory. Providing extra memory in the subscriber terminals is expensive because of the hundreds or thousands of such terminals that are in a typical cable system. Frequently, customers may prefer a less expensive unit that provides only a portion of the data supplied by EPG data provider 16, such as the next few hours. The customers can then benefit from lower cable service bills or purchase expenses if customers are to own the terminals. Thus, ISP 42 is provided with the capability of selecting only certain portions of the EPG data to be transmitted to subscribers. ISP 42 receives the EPG data, selects the portion to be transmitted to subscribers and passes only that portion to a scrambler (44 and/or 46). By selecting only a portion of the data provided by EPG data provider 16, less data is transmitted than would otherwise be the case. Thus, the data repetition rate is increased. Not only may ISP 42 select portions of the EPG data, but it may also add data on local stations not covered by EPG data provider 16. ISP 42 may also reformat the data in such a way as to make it more pleasing to the subscribers.

As stated, in a preferred embodiment, the EPG data is transmitted in the vertical blanking interval of at least one of the television signals. EPG data is constantly being transmitted in the vertical blanking interval by the scramblers. Scramblers 44 and 46 have memory dedicated to storing the EPG data. The amount of memory depends on the size of the EPG to be transmitted to the subscribers. If the ISP is going to select only a small portion of the EPG data provided by the EPG data provider, e.g., a few hours, then a small memory, perhaps 128k bytes, may be sufficient. For larger segments, 512k bytes may be necessary. And, for a couple of weeks of programming data, 1M bytes may be required. The ISP periodically updates the scrambler memory with new data received from the EPG data provider 16. ISP 42 tags the data as either long term or short term, depending on whether the data concerns a shortly upcoming program or a more distant one. The scrambler sends out the short term data more frequently than the long term data. This is because the EPG is stored in memory at the subscriber terminal 14, and must be updated frequently. But the subscriber terminal is not constantly tuned to channel where the EPG data is located. As will be described later, the subscriber terminal 14 tunes to the EPG data channel wherever possible to obtain update information. By sending out short term data very frequently, it is likely that a given subscriber terminal will have accurate short term data stored in it, which is the most important data to a user of the subscriber terminal. Long term data is sent out less frequently. Programming changes may also be grouped with the short term data.

As discussed above, ISP 42 may also receive text data from an information service provider, such as a stock quote service. ISP 42 can also generate text

locally. For example, ISP 42 may generate messages for transmission to subscribers concerning upcoming events or service interruptions or changes. If received from an information service provider, the text data may either be transmitted as received or reformatted by ISP 42, then transmitted to a scrambler (44 or 46) for transmission to subscribers.

ISP 42 also passes data to headend controller ("HEC") 28, which controls scramblers 48, 50 and 52, and also outband data transmitter 54. The scramblers 48, 50 and 52 scramble television signals and may also insert in-band data. The outband data transmitter 54 transmits data on a separate carrier, i.e., not within a 6 MHz channel. In a preferred embodiment, the out-of-band carrier is at 108.2 MHz, but other out-of-band carriers may also be used. The data transmitted under the control of HEC 28 may be, for example, descrambling information. In a preferred embodiment, data is inserted in each vertical blanking interval to indicate the type of scrambling employed in the next video field. Scrambling systems are well known in the art. For example, sync suppression scrambling, video inversion scrambling, etc or some combination of scrambling techniques may be used. Further, authorization information could be transmitted; this information would authorize the reception of channels or programs. Data may also be transmitted over non-scrambled channels via data repeaters (not shown) such as a Scientific-Atlanta Model 8556-100 data repeater either as in band audio or video data.

Some of the information transmitted would be global, i.e., every subscriber would get it. For example, the descrambling information could be a global transmission. Note that just because each subscriber receives the descrambling information does not mean that each subscriber terminal can descramble a received

signal. Rather, only authorized subscriber terminals would be capable of descrambling the received signal. On the other hand, data transmissions may be addressed transmissions. For example, authorization data would normally be addressed to individual subscribers. That is, when transmitted, the data will have an address (for example, a subscriber terminal serial number) associated with it. The subscriber terminal addressed will receive the data and respond accordingly. Other subscriber terminals will ignore the data. Further, there can be group addressed data, which will affect groups of subscribers. The outputs of scramblers 44, 46, 48, 50, 52 and outband data transmitter 54 are passed to any necessary processing equipment, such as signal processors, modulators and combiners. These elements are generally indicated as block 56 and do not form a part of the instant invention. A distribution system 58 leads to a subscriber terminal 14.

At the subscriber location, a subscriber terminal 14 is found. At the subscriber location, subscriber terminal 14 is connected to the subscriber's video equipment, including, for example, a VCR 18 and television 20. Multiple subscriber terminals 14 may be located at a premises with several television receivers 20.

Figure 3 is a detailed block diagram of the decoder. Referring to Figure 3, a detailed block diagram of one of the subscriber terminals will now be described. The broadband television signal from the signal distribution system 58 is received at the input of up/down converter or tuner 100. Conventionally, the up/down converter 100 may include an input filter, such as a diplexer, to separate the 108.2 MHz out-of-band signal and the broadband television signal. More than one tuner may be provided (not shown) to provide, for example, picture-in-picture

services or watch/record modes. An out-of-band data receiver 150 is coupled to tuner 100 to receive the separated out-of-band data. The up/down converter 100 can be tuned to a predetermined channel for receiving in-band video and audio data when not in use. The channel may be predetermined from the system manager 22 and, by one of the data transmission methods described herein, the predetermined channel identification can be stored in the subscriber terminal 14.

When in use, the up/down converter 100 is tuned according to a channel selected by a subscriber via a user interface having an infrared (IR) receiver 124, remote control 126 and terminal keypad 122. Up/down converter 100 uses a phase locked loop under the control of a tuning control 102 to convert the selected or predetermined default RF channel signal to a 45.75 MHz intermediate frequency signal. A multifunction control circuit (MCC) 104 is linked to up/down converter 100 by a bidirectional link to the tuner control 102. The MCC 104 is preferably an application specific integrated circuit (ASIC) combining many subscriber terminal control and data handling functions into a single package. Of course, the ASIC may include any combination of individual control circuits. Alternatively or in addition, other control circuitry may be used, for example a microprocessor.

The bidirectional link may include one path for tuning and a return path for feedback control of the tuning process. A feedback signal for automatic gain control and one for automatic frequency control are transmitted to the up/down converter 100 through filters 101, 103, respectively from a video demodulator.

A filter, for example a SAW filter 106, filters the IF channel signal to split the signal into separate video and audio portions for processing. The video portion is demodulated and descrambled by the video demodulator and descrambler 109

under the control of the descrambler control 110 of the MCC 104. For example, the video demodulator 109 may perform sync restoration (one form of descrambling of the video signal) for sync suppression scrambling. The video signal then passes through a bandpass filter 130 to an on-screen display control 132 where inverse video inversion (descrambling) takes place, if necessary. The descrambling of the video portion, whether sync suppression, sync inversion, video line inversion, etc., is under the control of the descrambler control 110 of the MCC 104. The descrambler control 110 provides the necessary timing signals, inversion axis levels, and whether the video is inverted or not to the on-screen display control 132 and supplies the necessary timing, restoration levels, and identification sync pulses to be restored to the video demodulator 109. The descrambler control 110 receives such descrambling information either from pulses as in-band audio data or from data modulated on the video during the vertical blanking interval.

In the other path, the audio signal is converted from the 41.25 MHz IF carrier to the intermodulation frequency of 4.5 MHz by a synchronous detector 105. Feedback for automatic gain control of detector 105 is supplied from the output of bandpass filter 131. The audio signal may then be demodulated by an FM demodulator 119. An amplitude modulation detector 111 performs pulse detection to recover the in-band audio data which are amplitude modulated onto the audio carrier. The received in-band pulses are supplied to an in-band audio data decoder 117 of MCC 104 for processing after being shaped by pulse shaper 115. The in-band data, except for descrambling data, is stored in DRAM 137 for



buffering. Descrambler control 104 accesses descrambling data directly for the video descrambling operation.

Volume control of the audio signal is performed under control of a volume control 41 and the microprocessor 128 as described in U.S. Patent No. 5,054,071, incorporated herein by reference. After volume control, the audio signal is passed through a low pass filter 123 and a mute switch 125. The output of the mute switch 125 is applied to a modulator 142.

The MCC 104 receives the video signal after demodulation and descrambling and detects the in-band video data from the VBI of the signal with a VBI detector. The in-band video data is transmitted at a frequency on the order of known teletext systems, such as 4.0 megabits per second. However, the invention should not be considered limited in this respect. A data clock provides an appropriate sampling frequency higher than the Nyquist rate according to well known techniques. The VBI data decoder 129 stores the data in DRAM 137 prior to processing by the microprocessor. Additional details of the VBI data decoder can be found in application serial no. \_\_\_\_\_ (attorney docket no. 45910, filed concurrently herewith), which is expressly incorporated herein by reference. Further, the time-of-day is transmitted by the headend and stored in DRAM 137. For example, global time-of-day transmissions may periodically occur, based on satellite time standards as described in U.S. Patent No. 4,994,908, the teaching of which are incorporated herein by reference. Microprocessor 128 therefore has access to data indicating the current time.

The on-screen display control 132 selectively generates on-screen character and graphics displays in place of or overlaid on the video signal. For example,

the information stored in DRAM 137 by the VBI data decoder 129 may be read out to the on-screen display control and used to generate on-screen characters and/or graphics. The modulator 142 combines the video signal from the output of the on-screen display control 132 and the audio signal from the output of the mute control circuit 125 and converts the combined signal to the channel frequency selected by the microprocessor 128, such as channel 3/4 for NTSC. The combined and remodulated signal is supplied as an RF output to a television receiver in a well known manner.

A control microprocessor 128 controls the overall operation of the subscriber terminal 14. The subscriber communicates with and controls the microprocessor 128 through an interactive user interface with an on-screen display. The user interface includes keyboard 122 on the front panel of the subscriber terminal 14 and the remote control 126 which generates subscriber control signals for channel tuning, volume level control, feature selection, and the like. These subscriber commands are decoded by an input scanner and control 148 of the MCC 104. The remote IR receiver 124 of the user interface receives the commands from the IR or other remote control 126, as is well known in the art, and provides commands to the microprocessor 128. The user interface may additionally include a display, for example, a four-digit, seven segment LED display, which displays the tuned channel numbers and diagnostics.

When the keypad 122 or remote control 126 is utilized to select a command, the microprocessor 128 operates to execute the command. The subscriber terminal interacts with the subscriber by providing numerous on-screen displays which assists in the operation of the terminal. The on-screen displays

provide information and prompts to guide the subscriber through many of the complex features of the terminal. For example, the on-screen display may implement a menu page structure for providing screen-by-screen directions for using the subscriber terminal and its features.

The descrambler control 110 of the MCC 104 utilizes recovered descrambling data to generate appropriate control signals, for example, inversion control and equalizing, sync restoration or regeneration for descrambling, or otherwise restoring the input baseband television signal. A secure microprocessor 136 determines whether the descrambler control 110 of the MCC 104 carries out descrambling on a particular channel or what form of descrambling is required at a particular time by interpreting the authorization and control data downloaded from the system manager 22 (by any of the three data transmission schemes discussed herein, out-of-band, in-band audio or in-band video) into the internal non-volatile memory (NVM) of the device. The NVM in the secure microprocessor 136 stores secure data, for example, authorization data, scrambled channel data, some terminal configuration data and other required data.

The control processor 128 operates by running a control program which preferably is partially stored in a read-only memory internal to the processor and partially stored in an NVM, such as Flash EPROM memory 134. On-board clocks are provided for clocking the various circuits elements of the terminal. In addition, the control program of the microprocessor 128 may also reside in the NVM of an expansion card 138. The microprocessor 128 communicates with the NVM 134, 138 via a memory bus 141 which has data, address, and control lines. The microprocessor 128 also controls the data decoders 117, 129 and 146, volume

control 41, on-screen display control 132, and the tuner control 102, descrambler control 110 and input key scanner and control 148 via commands through MCC 104 and control processor bus (CMB) 131. The microprocessor 128 directly controls the mute switch 125 and the output frequency selection of the modulator 142. The microprocessor 128 includes additional capacity for other auxiliary device communications and control through a data port 140. For example, the data port may accommodate an IR blaster for VCR control via an on-screen menu, an additional subscriber terminal for dual tuner operation, or connection to a digital video subscriber terminal.

The subscriber terminal 14 may receive addressable and global data, other text data, and descrambler data transmitted from the headend 12 via the in-band vertical blanking interval (VBI). Alternatively or in addition, addressable and global data may be transmitted in a separate out-of-band data carrier if an out-of-band receiver is provided. The memory control 112 permits data coming from the three data decoders 117, 129, and 146 to be placed in a volatile memory, for example DRAM 137. There it can be accessed by the control microprocessor 128 via the CMB 131. The MCC 104 also distributes control instructions from the control microprocessor 128 to other parts of the MCC 104 to provide operation of the rest of subscriber terminal 14. The MCC 104 additionally connects to a secure microprocessor bus (SMB) 143 which permits communications between the secure microprocessor 136 and other portions of the subscriber terminal 14. The SMB 143 is further coupled to the expansion card 138 to provide renewable security.

The memory control 112 and microprocessor interfaces of the MCC 104 are the central communications facility for the control microprocessor 128 and the

secure microprocessor 136. The memory control 112 receives requests from the microprocessors 128, 136 and other controls and data decoders to write to memory or read from memory. It resolves contentions for memory transfers, giving priority to real time applications and the micro-processors, and schedules the data flow. The microprocessors 128, 136 communicate through internal registers of the MCC 104 with the memory control 112 and other portions of the MCC 104.

The expansion card 138 may be a printed card which contains memory and/or secure microprocessor components, which can be plugged into a connector 200. The connector 200 can be configured such that, when it receives the expansion card 138, the expansion card is flush with top cover. The connector 200 electrically extends the control microprocessor memory bus 141 and the secure microprocessor bus 143 to the expansion card 138. Additional program or data memory, renewed security, or any other application supported by microprocessors 128, 136 can be provided by the expansion card 138. In addition, circuitry coupled to microprocessor 126 may be provided for detecting whether or not the expansion card is installed. Thus, the subscriber terminal 14 may be controlled in accordance with information contained on the expansion card 138 when installed and in accordance with internal software when the expansion card 138 is not installed. Additional details concerning the expansion card 138 may be obtained from U.S. Patent Application Serial No. 07/983,910, entitled "Subscriber Terminal with Plug In Expansion Card", which is incorporated herein by reference.

The subscriber terminal may optionally include an impulse-pay-per-view (IPPV) module of the telephone type 252 or of the RF-IPPV type 154. Alternatively, such reverse path information may be transmitted via an optical link.

The IPPV module allows subscribers to request authorization of their subscriber terminal to receive pay events such as pay-per-view events or near-video-on-demand (NVOD) transactions, store the data associated with the purchase of the event in the NVM of the secure microprocessor 136, and then transmit the data to the system manager 22 via the telephone return path or the RF return path via the signal distribution system.

Furthermore, "interactive television" information may be transmitted to the system manager 22 via the RF or telephone IPPV module or other reverse path transmission. In such case, the subscriber terminal may receive information defining a menu which may be immediately displayed. When the user responds to a menu prompt, the resulting information may be immediately transmitted as return data. For example, the user may respond to a poll by entering information to the keyboard. The results of the poll may be determined at the head end and later reported to the subscriber terminals. Additional details concerning the interactive television can be obtained from U.S. Patent Application Serial No. \_\_\_\_\_ (Attorney Docket No. 1263.45816), filed concurrently herewith, and expressly incorporated herein by reference.

Figure 4A shows a screen of the electronic programming guide provided in accordance with one embodiment of the invention. The electronic programming guide is produced by the subscriber terminal 14 from data stored in its memory. The memory and memory control circuitry was described in regard to Figure 3. The EPG may be activated and displayed from the subscriber terminal or a remote control, such as remote control 126 in Figure 3. For example, a switch on remote control 126 may be labeled as "Programming Guide" or the EPG may be selected

from a menu provided by subscriber terminal 14. Further, keyboard 122 on terminal 14 may also be used to activate the programming guide.

Horizontally indicated at block 60 are date and time slots. Channel selections appear vertically on the left side of the screen. Of course, the arrangement of the channels and times could be reversed in an alternative embodiment. For example, at block 62 is found HBO, which is channel 15 in the figure. The name of a television program is associated with each time slot and channel slot. For example, associated with the 7:30 p.m. time slot and channel 14 is "Gilligans Island", shown at block 64. The channels on the left-hand side of the EPG are arranged in numerical order from top to bottom. When the EPG feature is first activated, the screen will show the current channel tuned, for example, in the third-from-top channel slot, with the corresponding program descriptions highlighted to indicate a cursor. The description will include the title, and may include other information such as ratings or an indication that the program is closed-captioned. For example, block 66 provides all of this information. The time slots initially shown, for example, will be the slot starting at the last 30-minute or 1-hour slot and the next three 30-minute slots. Of course, the default features described are for example only and others may be used in accordance with the invention.

The remote control 126 will be provided with cursor direction keys "UP", "DOWN", "LEFT" and "RIGHT" or arrows representing these directions. These keys move the cursor around the EPG. The cursor moves in 30-minute and one channel increments. The current placement of the cursor is indicated by a highlighted program at that location. The cursor placement may also be indicated

by highlighting the channel and time selected at the cursor location. See Figure 5, for example, where the cursor is on "Jake & the Fatman" and WAGA channel 4 is highlighted along with the 9:00 start time. When the cursor reaches the edge of the screen, the entire screen is shifted one slot each time a direction key is actuated to seek information not visible on the screen. Movement is similar to movement within a spreadsheet on a computer. When the subscriber reaches the last available time slot, the cursor will move no further in that direction. The terminal could provide that the cursor wrap-around to the first time slot on reaching the end, but that is not required and may even be confusing to the user. However, in preferred embodiment, the cursor does wraparound from highest channel to lowest channel and vice-versa. This allows the viewer to reach a channel of choice more quickly using the cursor keys. Further, direct channel entry is supported in the EPG mode. Direct channel entry moves the window to display the information on the channel the user selects and places the cursor on that channel. However, the terminal does not tune that channel unless the user selects it by actuating the "SELECT" key on remote 126. Further, when the cursor is located on a program, the user may request more information on the program by activating an "INFO" key on his remote. This will open a window giving additional information on the program, if such information is available. The information might include guest star listings or a summary of the program.

When the left or right cursor direction keys are held down, the screen increments twice in 30-minute steps, and then goes into a "fast mode". In the fast mode, the screen shifts in 2-hour increments, 4 times a second, but only the time and date bar is updated. The programming cells are left empty until the subscriber



releases the key, at which point, they fill with the relevant programming information. The fast mode gives an effective rate of 8 hours per second. When the cursor is moved vertically from a large time block to a smaller time block, the cursor stays in the same time block.

When the cursor is over a feature the user would like to see, then a "SELECT" switch is actuated and that channel is tuned. Alternatively, the "SELECT" switch may drop the user into a menu that allows him to either watch the program or record it. If the watch option is chosen, the channel is tuned. If the record option is chosen, the terminal will program VCR 18 to record the program, or at least program itself to turn on and tune the proper channel when the program is available.

Pay-per-view events may also be chosen from the EPG. Referring to Figure 5 again, pay-per-view events are available on channel 5. Pay-per-view events need not be dedicated to a particular channel but, in the present example, channel 5 is dedicated to pay-per-view programs. The pay-per-view event shown is "Terminator 2". Note that simply using the select key to tune that station will not enable viewing as the program is scrambled. Rather, the user must purchase the program. The user places the cursor over the program, then activates a "BUY" button. The user may preferably be required to confirm his choice by activating the "BUY" button again to avoid accidental purchases. The user may also have to enter a security number to complete this purchase. The user may chose whether this feature is activated. For users with children, babysitters, etc. in the home, the security number feature may be activated. For those who want simple programming, it may be deactivated.

Figures 6-8 illustrate pay-per-view selection from the viewing guide. Figure 6 shows a pay-per-view ("PPV") selection highlighted. Note in this figure, the pay-per-view selection is on a white background while non-selected slots are on a grey background. In Figure 5, the background for the selected slot was black. Any method indicating the selection may be used and falls within the scope of the invention. From this point the user would press "BUY" to purchase "Terminator 2". The user will then preferably be requested to confirm the selection by pressing "BUY" again.

If the user has the security number feature activated then a screen as shown in Figure 7 will appear. The user will be asked to enter his security number. If entered correctly, the screen of Figure 8 will appear indicating that the order has been entered. If the user has not selected the security number feature, then after the "BUY" key is pressed to confirm the purchase, the screen of Figure 8 will appear.

The user can then wait for the event to begin. At the appropriate time, the subscriber terminal will tune the purchased event. Or the user can watch other programs until the event begins. If the user chooses to watch other programs until the event begins, a message will alert the user that the event has begun and that he should tune to it. Alternatively, the terminal may automatically tune to the event when it begins.

More details of the electronic programming guide and associated features will now be described. As discussed above, the EPG allows a subscriber to view a schedule of programming for the next several hours. The actual number of hours depends on the amount of memory installed. The EPG information is

downloaded from the headend via data transactions and is stored in RAM. Of course, since programs are constantly being shown, this original data quickly becomes outdated. Therefore, update data is constantly sent to the terminal on an EPG data channel. Even though referenced as an EPG data channel, the channel need not be limited to EPG data. In fact, it can contain video, with the updated EPG data being placed in the vertical blanking interval. The subscriber terminal tunes to the EPG data channel whenever possible. For example, when the terminal is turned off, it enters an off mode and tunes a default channel, called an "off" channel. However, the terminal frequently tunes back to the EPG channel for updated information. In a preferred embodiment, the EPG data channel is tuned every 30 minutes to obtain updates. After the update, the off channel is retuned. Therefore, as programs are shown, the memory allocated to their listings is replaced with data concerning future programs. Similarly, during menu operations, the terminal may tune the EPG data channels for an update. Of course, when the user enters the EPG mode, the terminal automatically tunes the EPG data channels to update its memory.

The data displayed by the EPG can be varied according to system requirements. However, it must be recalled that this data is stored in memory in the subscriber terminal. Therefore, the more information given about a specific program, the fewer the number of programs than can be described with a given memory size. Terminals with as little memory as 256k bytes will display a few hours of programming, while 1M bytes will give 2 days of programming. With 4M bytes of memory, up to two weeks of programming may be stored. As discussed above, large memories add cost to the system. However, VCR

programming options will be less useful unless at least one or two weeks of programming are available on the EPG as most VCRs have 7 or 14 day timers.

Some description of the storing and updating of the EPG data is necessary for a full appreciation for the invention. The EPG data sent by the scramblers (or data repeaters) is tagged to indicate the date, time, and channel with which it is associated. That data is received by the subscriber terminal. When the subscriber terminal receives data corresponding to the current day and half-hour, it begins storing that data in its memory for all the channels. The subscriber terminal then receives and stores data for the next half-hour slot for that day for all channels. This continues until the subscriber terminal exhausts the memory allocated for the EPG. Subsequent EPG data for future times is ignored. Therefore, decoders with different memory sizes can be accommodated in the same system. If one subscriber terminal has 256k bytes of memory, and can only store a few hours of the EPG, the terminal stores that much and ignores the rest. On the other hand, if the terminal includes 4M bytes of data, it may store up to that much data. Referring to Figure 4B, the update process shown. First, data in the direction of arrow 68 is stored because that data corresponds to the current hour and date. Data is stored for all channels for that time and date. In other words the entire column under "7:00PM" is stored in memory. Data from the 7:30 p.m. time slot is then stored in memory as indicated by the arrow 70. This process continues until the memory of the subscriber terminal allocated for EPG storage is filled.

The amount of memory allocated for EPG storage depends, of course, on the total memory available in the subscriber terminal. The system manager 22 via HEC 28, in a preferred embodiment, initiates the transmission of group addressed

data to subscriber terminal groups indicating the amount of memory the terminals should allocate to the EPG via scramblers, data repeaters or out-of-band transmitters. Each subscriber terminal group contains subscriber terminals of a given memory size. Thus, the groups will each receive data instructing them to allocate the proper amount of data to the EPG, which amount will depend on the memory available in the terminals of the recipient group.

Yet another limitation on the EPG is the number of characters that will fit in a slot of the EPG grid. For example, in the preferred embodiment, 30-minute shows must be described in 18 characters or less, that is, two lines of nine characters each. For shows one hour or longer, up to 38 characters may be used, two lines of 19 characters. The number of characters available for a one-hour show is slightly more than twice the number available for a 30-minute show because the bar separating 30-minute shows may be used for additional data characters. Also, the background of the EPG may be selected to indicate a theme. For example, all westerns could be on a blue background, all sports on a red background. Use of such categories also allows a category listing to be provided by the terminal. For instance, the terminal can display all sports event for a given day. Categories are, in a preferred embodiment, arranged in a tree structure. Thus, when choosing to see what sports programs are to be shown on a given day, the user might receive another menu, one offering to show separate listings for baseball, football, hockey, etc. Note each category must be defined in memory, as well as the tree structure. They are downloaded to the terminal by a global communication and stored in non-volatile memory.

As briefly described above, additional information can be described on "information" screens that may be associated with each program. In each information screen, in a preferred embodiment, 135 characters of description may be stored. That is three lines of 45 characters each. In this mode, in a preferred embodiment, the user is offered three options: 1)purchase, 2)record, and 3)watch. If the user selects the "purchase" option, the sequence shown in Figure 7 and 8 occur. That is, the user must confirm the purchase and enter the security number, if that option is activated. Figure 9 show an "information" screen. If the "watch" option is chosen, the channel is tuned. If the user selects the "record" option, a record sequence occurs. A remote video cassette recorder may be activated via data port 140 (Figure 3).

Of course, if the event is a pay-per-view event, a purchase sequence must occur before the program can actually be recorded or watched. For example, if the "watch" option is chosen, the subscriber terminal may tune to the channel and show it scrambled or watch a free preview for a short predetermined time. Or the user may be informed that he may purchase the event and offered a purchase sequence, or simply be informed by a barker that he must purchase the event before he can watch or record it.

The "record" option activates a record sequence. The sequence sets the terminal to activate to the proper channel at the proper time. The terminal can also set the user's VCR using known techniques or, in a less sophisticated embodiment, the user may simply be reminded to set his or her VCR timer.

Associated with the EPG is a channel listing. The channel listing shows each channel available on the system by channel number and a program identifier.

The program identifier (PID) is a three or four character identifier for each channel on the subscription television system. Each channel has an assigned PID. Some PIDs are fixed in ROM in microprocessor 128 (Figure 3); others can be downloaded into non-volatile memory (NVM) 134 (Figure 3). In a preferred embodiment 44 channels are listed at a time. If there are more than 44 channels, a "more" command appears and allow the user to see another page of channels. Figure 10 is an example of such a channel listing.

As cable systems have more and more channels, electronic viewing guides become more complex. If the cable system has 100 or more channels, the viewer may find maneuvering through the guide cumbersome. This is especially true for viewers who normally may spend most of their viewing time watching only a small number of the available channels. For these viewers, a favorite channel guide is available. The favorite channel guide is similar to the EPG except that it lists only a subset of the available channels. From a menu the user may define a list of his favorite channels. For example, the user might select the 10 channels he most frequently watches as his favorite channels. When the favorite channel guide is activated, only the programming appearing on those channel is shown in the grid form. Using the smaller guide is often quicker and easier for viewers. Of course, if nothing appeals to the user on those channels, the user may enter the EPG for a full listing. The favorite channel list is fully selectable by the user. Channels may be added or deleted at will. The favorite channel list can be used for other purposes as well. For example, by providing a "FAVORITE" key, the user may be allowed to sequentially tune each of his selected favorite channels to see what is playing on each own, bypassing the other (non-favorite) channels. Since on

most subscription television networks there are channels that have no appeal to a given subscriber, the favorite channel feature allows the subscriber to avoid having the appearance of those channels needlessly complicate his system.

Figure 11 shows the screen that allows a user to view and change his favorite channels. The favorite channels are shown with asterisks beside them. To add a channel to the favorite channel list, the user highlights the channel to be added by using the cursor movement keys and then activates the "SELECT" switch. To delete a channel from the favorite channel list, the user highlights a favorite channel and presses the "SELECT" switch, which deletes the channel. The user can also actuate the "CLEAR" switch and erase all favorite channels, therefore allowing the user to "start over" in selecting the favorite channels. To avoid accidental erasures the user may be asked to confirm his choice to erase all favorite channels, as shown in Figure 12.

More recently, subscription television providers have attempted to compete more effectively with video rental operations by offering a service termed "near-video-on-demand". Consumers enjoy the video rental experience for a number of reasons. Once the tape is rented, it may be used without restriction for a period of time, typically 24 hours. During that time, the user may pause the tape, stop it and resume viewing later, rewind it to replay a portion of the program or fast-forward to skip portions uninteresting to the viewer. On the other hand, with standard pay-per-view or other television programs, the user has no control over the feature.

In a near-video-on-demand system, a feature is shown on several channels, the showing on each channel being displaced in time from each other showing by



a specified time increment or multiple thereof. Thus, the system can approximate a video tape rental experience by allowing a subscriber to tune to other showings of the feature. For example, if the subscriber wants to replay the last scene, his terminal will tune the channel showing the feature one time increment prior to the showing being watched. Consider a two-hour movie. If 12 channels are allocated to the movie, then ten-minute increments can separate the various showings. Thus, if the subscriber wants to simulate a rewind function, he can tune back to the next later showing, which will be ten minutes before the current position. Similarly, if he wishes to pause, he may press a "PAUSE" button, which will allow a ten-minute pause then tune to the next later showing, which will be at the same position in the feature as where the pause was executed. To execute a fast-forward, the terminal tunes to the next earlier showing, which is ten minutes ahead of the showing previously tuned. Of course, all movement occurs in ten-minute increments; therefore, the experience is not exactly like a tape rental which allows complete freedom to pause, rewind and fast-forward. However, the feature allows a close simulation to a video tape rental without the inconvenience of renting and returning the video tape. Much like a video tape, the user has the option to buy the feature for 1-day, 2-days, or longer. During that time, he can view the feature as he wishes. The rewind "BACK" and fast-forward "FWD" buttons can be used repeatedly to move multiple increments forward or backward. Further, these buttons allow wraparound. To actuate the "BACK" button near the beginning of the movie, brings up a point near the end of the movie. To actuate the "FWD" button near the end of the movie brings up the beginning of the movie.

To conserve bandwidth, larger time increments between shows may be used. For example, with a two-hour movie, only six channels will be required if 20-minute increments are used. But 20-minute increments may be annoying to subscribers.

Referring now to Figures 13 - 17A, the near-video-on-demand service is illustrated. Figure 13 shows a pay-per-view screen allowing the user to choose the duration for which he would like to have access to the feature. The user selects the time period and is then directed to choose a start time for the program. Figure 14 shows three selections: 1) current showing with an indication as to how much the user will miss if he chooses this showing, 2) the next showing or 3) a future showing. If the user selects the current or next showing, he may be directed to enter his "access number" if this feature has been activated. This screen is shown in Figure 15. If he selects a future showing, the user will be given the display shown in Figure 16 and asked to choose a future showing. The future showings are listed and the user highlights the one of his choice and presses the "SELECT" key. A confirmation screen as shown in Figure 17A will then appear. The screen will confirm what purchase was just made so that the subscriber can verify what he purchased.

At the chosen time, a barker will appear indicating that "Terminator 2" may be watched on Channel "XX", or optionally, the subscriber terminal can automatically tune the channel where the event is appearing.

The "PAUSE" screen is shown in Figure 17B. The "PAUSE" screen is useful because it allows the user freedom to either restart the movie on the same showing he was watching and miss a portion of the movie or wait for the next

showing. If the pause feature was only activated a minute or two, for example, to allow the viewer to take a quick phone call, the viewer may prefer to miss the minute or two of the movie rather than wait for the next showing. However, if the pause has continued longer, the viewer will likely want to wait for the next showing to begin. At that time, the tuner in the subscriber terminal will automatically tune the proper channel to allow the user to resume viewing from the point where the pause was activated. The tuning operation is under the control of control microprocessor 128 (Figure 3). Similarly, when the "BACK" and "FWD" keys are actuated, the control microprocessor 128 will cause the tuning of the next previous or next subsequent showing.

While the above discussion centered on near-video-on-demand programs, other subject matter may also be purchased in a near-video-on-demand format, i.e., for a period of time. For example, electronic games could be downloaded from the headend and the subscriber allowed to play them for a limited period of time. The user could purchase the games for a chosen period of time. This feature is described in more detail in application Serial No. \_\_\_\_ (Attorney Docket No. 45816), filed concurrently herewith and expressly incorporated herein by reference.

While an advantage of the instant invention is that the user may purchase pay-per-view events from the EPG, that is not the only method of purchasing the events. Whenever watching a program, the user may activate the "MENU" command. A "MAIN MENU" will appear. The "MAIN MENU" preferable has a "PAY-PER-VIEW" option. Also, the remote control may have a "PAY-PER-VIEW" key. Whenever the "PAY-PER-VIEW" option is activated (by menu or

key), a pay-per-view sub-menu appears. Such a menu is shown in Figure 18. The menu is arranged by categories of pay-per-view events. Further, the menu allows the user to review his pay-per-view selections.

If the user chooses a category, a screen similar to the one shown in Figure 19 appears. The user may select an event by highlighting it using cursor direction keys and pressing "SELECT". The user may also use the "NEXT PAGE" and "PREVIOUS PAGE" commands to move back and forth in the menu. If the user picks a pay-per-view program, then the purchase sequence illustrated in Figures 7 and 8 will begin. If the feature is a near-video-on-demand event, then the purchase sequence illustrated in Figures 13-17A will begin.

If, on the menu of Figure 18, the user selects "REVIEW YOUR PURCHASES", a screen similar to that shown in Figure 20 will appear, if there are currently purchased pay-per-view events. The user may cancel a pay-per-view event that he previously purchased, but has not seen. Similarly, the viewer may return to a purchase screen such as that shown in Figure 18 to purchase additional programs. If the viewer has not purchased pay-per-view events, then a screen to that effect will appear as shown in Figure 21. The information on the pay-per-view events and near-video-on-demand events purchased is stored in memory in the subscriber terminal and can be accessed by microprocessor 128 on demand.

Further, while pay-per-view events have been described in the context of single features, e.g. movies, other variations are possible and fall with the scope of the instant invention. For example, a given channel, e.g. HBO, might be available for purchase for a chosen period of time, e.g. a weekend, as described in Application Serial No. 07/896,582, entitled "Method and Apparatus for

Providing Periodic Subscription Television Services", filed June 10, 1992 and expressly incorporated herein by reference.

While the invention has been described in detail with reference to the appended drawings, the invention is limited in scope only by the claims. Moreover, any application or patent cited herein should be construed to be incorporated by reference as to any subject matter deemed essential to the present disclosure.

**CLAIMS**

1. A subscription television system for supplying television signals to a plurality of subscribers, said subscription television system comprising:

first transmitting means for transmitting television signals comprising a plurality of television programs to said subscribers on a plurality of television channels, said television programs including at least one of a pay-per-view and near-video-on-demand program available only to customers who purchase said program, said first transmitting means also transmitting to said subscribers an electronic programming guide listing said television programs by date, time and television channel;

a subscriber terminal for receiving said television signals and providing the signals to a user of the subscription television system, said subscriber terminal including means for displaying said electronic programming guide and first selecting means for selecting said programs from said programming guide for use by said user, said first selecting means including means for purchasing said at least one of a pay-per-view and a near-video-on-demand program from said electronic programming guide.

2. A subscription television system according to Claim 1, wherein said subscriber terminal includes providing means for providing at least one of a pay-per-view or near-video-on-demand program to said subscriber in response to a purchase of said program through said first selecting means.

3. A subscription television system according to Claim 2, wherein said providing means includes storing means for storing an indication that said program has been purchased.

4. A subscription television system according to Claim 3, wherein said subscriber terminal includes second transmitting means for transmitting the contents of said storing means to a billing computer.

5. A subscription television system according to Claim 4, wherein said second transmitting means in said subscriber terminal transmits the contents of said storing means over a telephone network to said billing computer.

6. A subscription television system according to Claim 4, wherein said second transmitting means in said subscriber terminal transmits the contents of said storing means to said billing computer over a transmission line.

7. A subscription television system according to Claim 1, wherein said first transmitting means receives electronic programming guide data from an electronics programming guide data provider and selects a portion said electronic programming guide data to transmit to said subscribers as said electronic programming guide.

8. A subscription television system according to Claim 1, wherein said first transmitting means receives electronic programming guide data from an electronic programming guide data provider and supplements said data with locally generated data to form said electronic programming guide transmitted to said subscribers.

9. A subscription television system according to Claim 1, wherein said subscriber terminal provides second selecting means for selecting a subset of said channels provided by said subscription television system, said subscriber terminal including means for displaying only a portion of said electronic programming guide corresponding to programs appearing on said subset of channels.

10. A subscription television system according to Claim 1 wherein said electronic programming guide is transmitted to said subscribers by inserting data representing said electronic programming guide into said television signals.

11. A subscription television system according to Claim 10 wherein said electronic programming guide is transmitted to said subscribers by inserting said data into vertical blanking intervals present in said television signals.

12. A subscription television system according to Claim 10 wherein said electronic programming guide is transmitted to said subscribers by amplitude modulating said data onto at least one audio carrier associated with said television signals.

13. A subscription television system according to Claim 1 where said programming guide is transmitted to said subscribers by modulating said data on an out-of-band carrier for transmission to said subscribers.

14. A subscription television system according to Claim 11 where said subscriber terminal includes means for removing said data inserted in said vertical blanking intervals and storing said data in memory means in said subscriber terminal, wherein said means for displaying said electronic programming guide includes means for reading data from said memory means and displaying said data.

15. A subscription television system according to Claim 12 where said subscriber terminal includes means for demodulating said data modulated on said at least one audio carrier and storing said data in memory means in said subscriber terminal, wherein said means for displaying said electronic programming guide includes means for reading data from said memory means and displaying said data.



16. A subscription television system according to Claim 13 where said subscriber terminal includes means for demodulating said data modulated on said out-of-band carrier and storing said data in memory means in said subscriber terminal, wherein said means for displaying said electronic programming guide includes means for reading data from said memory means and displaying said data.

17. A subscriber terminal for receiving televisions signals comprising a plurality of television programs and an electronic programming guide from a subscription television provider, at least one of said television programs being one of a pay-per-view or near-video-on-demand program provided only to subscribers who purchase said program, the subscriber terminal comprising:

means for displaying said electronic programming guide;

first selecting means for selecting programs from said electronic programming guide for provision to a user of the subscriber terminal, said selecting means allowing the user to purchase said at least one of a pay-per-view and near-video-on-demand program from said electronic programming guide.

18. A subscriber terminal according to Claim 17, further including providing means for providing one of a pay-per-view and near-video-on-demand program to said user in response to said user purchasing said program through said first selecting means.

19. A subscriber terminal according to Claim 18, wherein said providing means includes storing means for storing an indication that said program has been purchased through said first selecting means.

20. A subscriber terminal according to Claim 19, wherein said subscriber terminal includes transmitting means for transmitting the contents of

said storing means to a billing computer associated with the subscription television provider.

21. A subscriber terminal according to Claim 20, wherein said transmitting means in said subscriber terminal transmits the contents of said storing means over a telephone network.

22. A subscriber terminal according to Claim 20, wherein said transmitting means in said subscriber terminal transmits the contents of said storing means to said billing computer through a transmission line.

23. A subscriber terminal according to Claim 17, further including second selecting means for selecting a subset of the channels provided by said subscription television system, said subscriber terminal including means for displaying only a portion of said electronic programming guide corresponding to programs appearing on said subset of channels.

24. A subscriber terminal according to Claim 17 wherein said electronic programming guide is transmitted to said subscribers by inserting data representing said electronic programming guide into vertical blanking intervals present in said television signals, said subscriber terminal including means for removing said data inserted in said vertical blanking intervals and storing said data in memory means in said subscriber terminal, wherein said means for displaying said electronic programming guide includes means for reading data from said memory means and displaying said data.

25. A subscription television system according to Claim 17 wherein data representing said electronic programming guide is transmitted to said subscribers by amplitude modulating said data onto at least one audio carrier associated with

said television signals, said subscriber terminal further including means for demodulating said data modulated on said at least one audio carrier and storing said data in memory means in said subscriber terminal, wherein said means for displaying said electronic programming guide includes means for reading data from said memory means and displaying said data.

26. A subscription television system according to Claim 17 where said programming guide is transmitted to said subscribers by modulating data representing said electronic programming guide on an out-of-band carrier for transmission to said subscribers, said subscriber terminal further including means for demodulating said data modulated on said out-of-band carrier and storing said data in memory means in said subscriber terminal, wherein said means for displaying said electronic programming guide includes means for reading data from said memory means and displaying said data.

27. A method of selecting one of a pay-per-view and near-video-on-demand program in a subscription television system, including the following steps:

displaying an electronic programming guide transmitted by a subscription television provider;

using a user interface to select and purchase said pay-per-view or near video-on-demand program from said electronic programming guide.

28. A subscription television system according to Claim 1, where said means for transmitting said electronic programming guide to said subscribers includes means for transmitting data representing the electronic programming guide tagged to indicate the date, time and channel to which the data pertains.

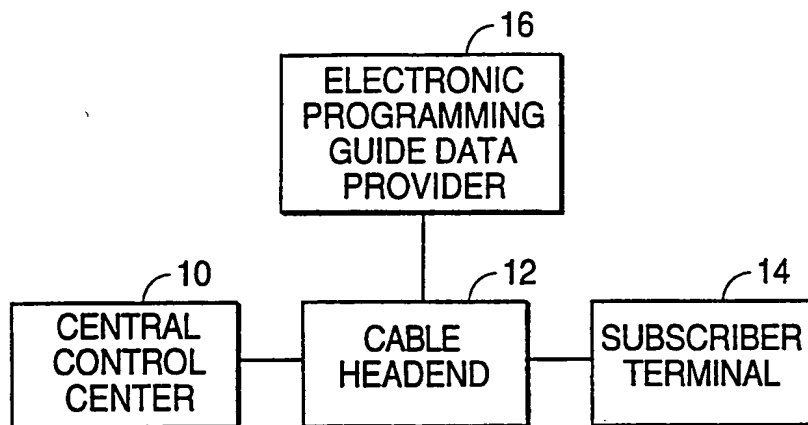
29. A subscription television system according to Claim 28, wherein said subscriber terminal receives said data tagged to indicate the date, time and channel to which the data pertains and loads said data into memory associated with said date, time and channel.

30. A subscription television system according to Claim 1, wherein said means for transmitting said electronic programming guide to said subscribers includes means for tagging said data as short term data or long term data, depending on the difference between the current time and date and the time and date to which the data pertains, the difference in the current date and time and the date and time associated with said short term data being shorter than the difference associated with said long term data, and said means for transmitting said electronic programming guide transmitting said short term data more frequently than said long term data.

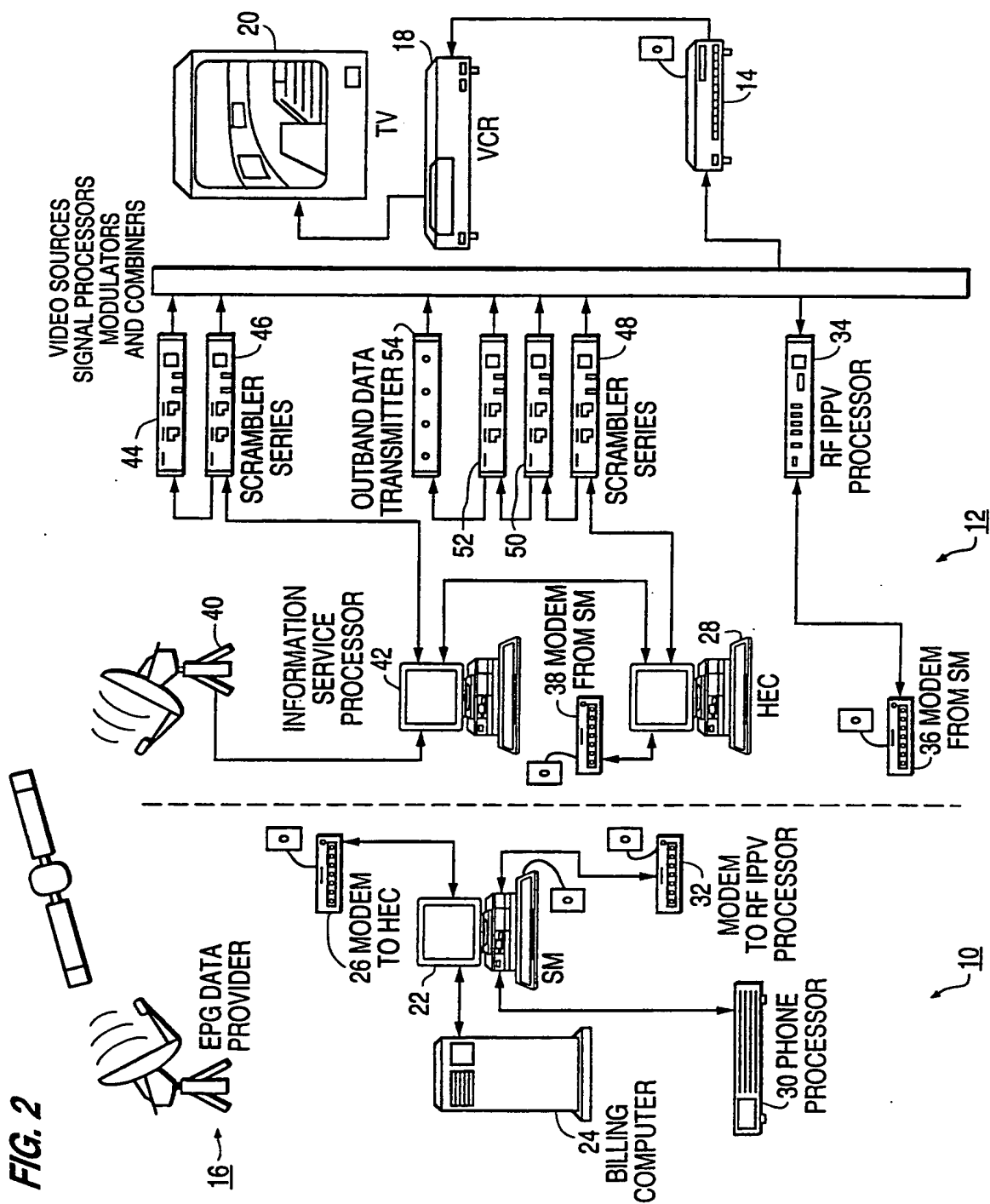
31. A subscriber terminal according to Claim 17, where data representing said electronic programming guide is sequentially transmitted to said subscribers and includes data tags to indicate the date, time and channel to which the data pertains, and said subscriber terminal receiving said data tags to indicate the date, time and channel to which the data pertains and loading said data into memory within said subscriber terminal associated with said date, time and channel.

32. A transmitter for transmitting at least one television signal containing a plurality of programs to a plurality of subscribers in a subscription television system, said transmitter also transmitting electronic programming guide data including data indicating the date, time and channel associated with said

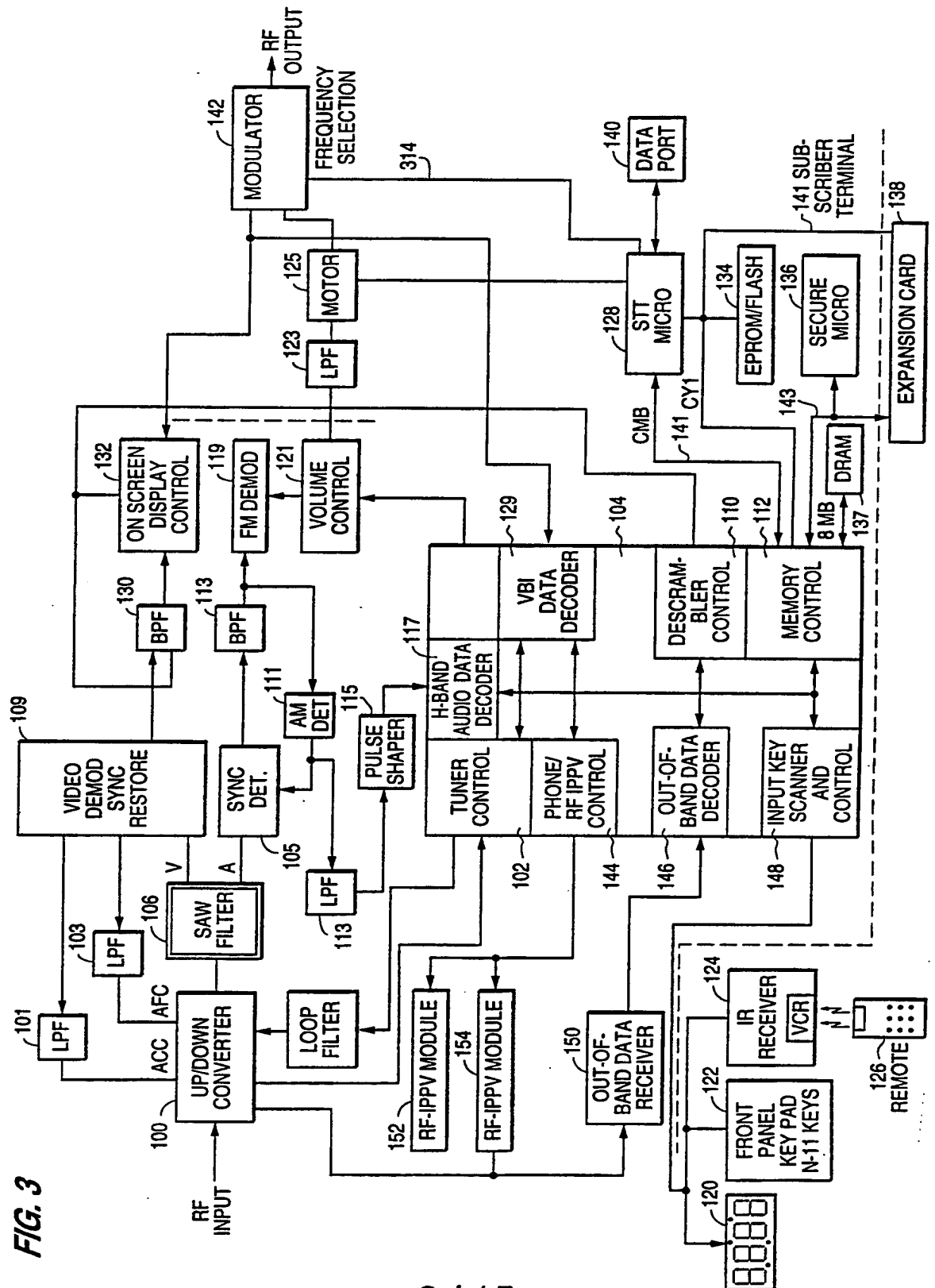
television programs, said transmitter repeatedly transmitting said electronic programming guide data, said transmitter grouping said electronic programming guide data into a plurality of groups and repeating the transmission of data associated with certain of said groups on a more frequent basis than others of said groups.

**FIG. 1****FIG. 4A**

03/05		7:00 PM	7:30 PM	8:00 PM	8:30 PM
WXIA 14	HOLLYWD SQUARES	GILLIGANS ISLAND	BRADY BUNCH	TOM AND JERRY	
HBO 15	TERMINATOR 2 [R] [CC]		HOME ALONE [PG] [CC]		
CMAX 16	TERMINA- TOR 2	WRESTLING			
ESPN 17	GOLF	WIMBLEDON		BOWLING	
SHOW 18	BAD NEWS BEARS [PG]			CITIZEN KANE	
TMC 19	ONE GOOD COP [R]			INVISIBLE MAN	
CURRENT TIME : 7:15PM    CURRENT DATE : 03/05					
PRESS [INFO] FOR DETAILS, [SELECT] TO TUNE. PRESS [MENU] TO EXIT.					



**FIG. 3**





**FIG. 4B**

	68	64	70	60	
	03/05	7:00 PM	7:30 PM	8:00 PM	8:30 PM
	WXIA 14	HOLLYWD SQUARES	GILLIGANS ISLAND	BRADY BUNCH	TOM AND JERRY
62	HBO 15	TERMINATOR 2 [R] [CC]		HOME ALONE [PG] [CC]	66
	CMAX 16	TERMINA- TOR 2	WRESTLING		
	ESPN 17	GOLF	WIMBLEDON		BOWLING
	SHOW 18	BAD NEWS BEARS [PG]			CITIZEN KANE
	TMC 19	ONE GOOD COP [R]			INVISIBLE MAN
CURRENT TIME : 7:15PM    CURRENT DATE : 03/05					
PRESS [INFO] FOR DETAILS, [SELECT] TO TUNE. PRESS [MENU] TO EXIT.					

**FIG. 5**

06/11	8:00	8:30	9:00	9:30
COMM 02	LOCAL PROGRAMMING AND INFORMATION			
WSB 03	FULL HOUSE	HOME IMPRVMENT	ROSEANNE	DOOGIE HOUSER
WAGA 04	EVENING SHADE	MAJOR DAD	JAKE & THE FATMAN	
PPV 05	TERMINATOR 2 R			
WATL 06	A TOWN TORN APART TV			
WTBS 07	BEVERLY HILLBILL	ANDY GRIFFITH	ADDAMS FAMILY	SANFORD & SON
CURRENT TIME : 8:15PM CURRENT DATE : 06/11				
PRESS [INFO] FOR DETAILS, [SELECT] TO TUNE. PRESS [FEATURES] TO EXIT.				

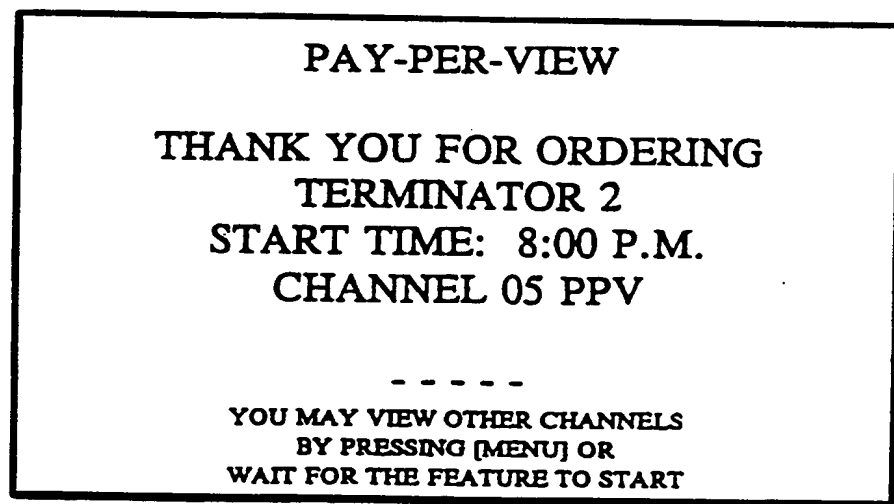
**FIG. 6**

06/11	8:00	8:30	9:00	9:30
COMM 02	LOCAL PROGRAMMING AND INFORMATION			
WSB 03	FULL HOUSE	HOME IMPRVMENT	ROSEANNE	DOOGIE HOUSER
WAGA 04	EVENING SHADE	MAJOR DAD	JAKE & THE FATMAN	
PPV 05	TERMINATOR 2 R			
WATL 06	A TOWN TORN APART TV			
WTBS 07	BEVERLY HILLBILL	ANDY GRIFFITH	ADDAMS FAMILY	SANFORD & SON
CURRENT TIME : 8:15PM    CURRENT DATE : 06/11				
PRESS [INFO] FOR DETAILS, [SELECT] TO TUNE. PRESS [FEATURES] TO EXIT.				

***FIG. 7***

<p><b>PAY-PER-VIEW</b></p> <p><b>PLEASE ENTER YOUR PAY-PER-VIEW ACCESS NUMBER</b></p> <p><b>TERMINATOR 2 \$1.99</b> <b>START TIME: 8:00 P.M.</b> <b>CHANNEL 05 PPV</b></p> <p>-----</p>
---

***FIG. 8***



## ***FIG. 9***

PPV CH 05

TERMINATOR 2

ARNOLD SWARZENEGGER STARS IN FUTURISTIC  
BATTLE TO SAVE HUMANITY FROM DESTRUCTION  
BY RENEGADE COMPUTERS.

STARTS AT 8:00 PM ON 11/15

1. PURCHASE (\$ 4.95)
2. RECORD
3. WATCH

**FIG. 10**

CHANNEL LISTING			
02 COMM	13 WXIA	24 WHSC	35 CITY
03 ABC	14 SHOW	25 WOPR	36 PUB
04 CBS	15 HBO	26 WMRJ	37 EDUC
05 MTV	16 ADS	27 NICK	38 TLC
06 WATL	17 CBN	28 WGN	39 DISC
07 WTBS	18 TMC	29 FNN	40 DISN
08 GPTV	19 CMAX	30 PLAY	41 CNN
09 WGNX	20 QVS	31 TRAV	42 HNN
10 TNT	21 INFO	32 BRAV	43 CSC
11 FOX	22 USA	33 BET	44 ESPN
12 NBC	23 AMC	34 UNI	MORE

PRESS [SELECT] TO TUNE, [MENU] TO EXIT.

**FIG. 11**

FAVORITE CHANNELS			
02 COMM	11 WXIA	20 WHSC	29 CITY
03 ABC	12 SHOW	21 WOPR	30 PUB
04 CBS	13 HBO	22 WMRJ	31 EDUC
*05 MTV	14 ADS	*23 NICK	32 TLC
06 WATL	15 CBN	24 WGN	33 DISC
07 WTBS	16 TMC	25 FNN	34 DISN
08 GPTV	*17 CMAX	*26 PLAY	35 CNN
09 WGNX	18 QVS	27 TRAV	[CLEAR]
10 TNT	19 INFO	28 BRAV	[MORE]

USE . . . TO HIGHLIGHT YOUR CHOICE, THEN  
PRESS [SELECT]. A '\*' MEANS CHANNEL IS  
FAVORITE, PRESS [MENU] TO EXIT.

**FIG. 12**

PRESS [SELECT] TO CLEAR ALL FAVORITE  
CHANNELS.

PRESS [LAST] TO RETURN TO FAVORITE CHANNELS.

PRESS [MENU] TO EXIT.

**FIG. 13**

PAY-PER-VIEW	
YOU CAN VIEW	
TERMINATOR 2. R	
FOR ONE OF THE FOLLOWING PERIODS	
ONCE	\$1.99
1 DAY	\$2.99
3 DAYS	\$3.99
1 WEEK	\$4.99
MOVE THE CURSOR TO HIGHLIGHT YOUR CHOICE THEN PRESS SELECT	

**FIG. 14**

PAY-PER-VIEW	
TO PURCHASE TERMINATOR 2. R	
FOR A 1 DAY PERIOD - \$2.99	
SELECT A START TIME	
1.	CURRENT SHOWING (BEGAN 3 MINUTES AGO)
2.	NEXT SHOWING (6:30 P.M.)
3.	FUTURE SHOWINGS
MOVE THE CURSOR TO HIGHLIGHT YOUR CHOICE THEN PRESS SELECT	



**FIG. 15**

PAY-PER-VIEW

PLEASE ENTER YOUR  
PAY-PER-VIEW  
ACCESS NUMBER

TERMINATOR 2. R \$2.99  
STARTING JANUARY 30, CHANNEL 05 PPV  
AT 8:00 P.M.  
FOR A 1-DAY PERIOD

-----

**FIG. 16**

PAY-PER-VIEW

TO PURCHASE TERMINATOR 2. R  
FOR A 1 DAY PERIOD - \$2.99  
SELECT A START TIME

6:30	P.M.	10:30	P.M.
7:00	P.M.	11:00	P.M.
7:30	P.M.	11:30	P.M.
8:00	P.M.	12:00	A.M.
8:30	P.M.	12:30	A.M.
9:00	P.M.	1:00	A.M.
9:30	P.M.	1:30	A.M.
10:00	P.M.	2:00	A.M.

MOVE THE CURSOR TO HIGHLIGHT YOUR  
CHOICE THEN PRESS SELECT

## ***FIG. 17A***

<p>PAY-PER-VIEW</p> <p>THANK YOU FOR ORDERING</p> <p>TERMINATOR 2. R \$2.99 STARTING JANUARY 30, CHANNEL 05 PPV AT 8:00 P.M. FOR A 1-DAY PERIOD</p> <p>YOU MAY USE THE [PAUSE] [BACK] AND [FWD] KEYS DURING THIS PROGRAM</p> <p>YOU MAY VIEW OTHER CHANNELS BY PRESSING [MENU] OR WAIT FOR THE PROGRAM TO START</p>
---

## ***FIG. 17B***

12:42 A.M.	CH 130 PPV 05
TERMINATOR 2. R	
PAUSE	
MOVIE RESTARTS IN 9 MINUTES	
PRESS SELECT NOW TO RESTART MOVIE AND MISS 4 MINUTES	

**FIG. 18****PAY-PER-VIEW  
SELECTIONS**

1. OLYMPICS
2. MOVIES
3. SPORTS
4. NEW RELEASES
5. MISCELLANEOUS
6. WESTERNS
7. REVIEW YOUR PURCHASES
8. PREVIOUS PAGE
9. NEXT PAGE

MOVE THE CURSOR TO HIGHLIGHT YOUR  
CHOICE THEN PRESS SELECT. PRESS INFO  
FOR DETAILS

**FIG. 19****PAY-PER-VIEW  
SPORTS**

1. MONSTER TRUCK 3
2. WRESTING MANIA
3. NHL STANLEY CUP
4. NFL SUPER BOWL
5. GEORGIA VS GEORGIA TECH
6. DAYTONA 500
7. INDIANAPOLIS 500
8. PREVIOUS PAGE
9. NEXT PAGE

MOVE THE CURSOR TO HIGHLIGHT YOUR  
CHOICE THEN PRESS SELECT. PRESS INFO  
FOR DETAILS

## **FIG. 20**

**PURCHASED SELECTIONS**

TERMINATOR 2. R  
VIEWABLE UNTIL WED ON CHANNEL 05  
MONSTER TRUCKS. 3 NR  
VIEWABLE UNTIL SAT ON CHANNEL 150  
JFK. R  
08/16 8:00 P.M.

1. CANCEL PURCHASE
2. PURCHASE MORE PROGRAMS
3. PREVIOUS PAGE
4. NEXT PAGE

MOVE THE CURSOR TO HIGHLIGHT YOUR  
CHOICE THEN PRESS SELECT. PRESS MENU  
TO EXIT

## **FIG. 21**

YOU HAVE NOTHING PURCHASED  
AT THIS TIME

PLEASE PRESS SELECT

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US95/04330

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04N 1/00, 7/00

US CL :CL 348/1, 2, 3, 7, 12, 13, 455/2, 4.2, 5.1

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : CL 348/1, 2, 3, 7, 12, 13, 455/2, 4.2, 5.1

CL 348/17; 380/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim
X -- Y	US, A, 4,439,784 (FURUKAWA ET AL) 27 MARCH 1984, NOTE 4:18, 19, 38, 39.	1-4, 6-8, 1 14-20, 22, 2 32 ----- 5, 11-13, 2 24-26, 30, 32
X -- Y	US, A, 5,168,353 (WALKER ET AL) 01 DECEMBER 1992 NOTE 2:18-21	1-4, 6-8, 1 14-20, 22, 27-29, 31 ----- 5, 11-13, 2 24-26
X,P	US, A, 5,357,276 (BANKER ET AL) 18 OCTOBER 1994, SEE ENTIRE DOCUMENT.	1-8, 10-22, 2 29, 31

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 29 JUNE 1995	Date of mailing of the international search report <b>31 JUL 1995</b>
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer <i>Diane Goodwyn</i> STEPHEN C. BUCZINSKI Telephone No. (703) 308-0476

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US95/04330

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim
Y	US, A, 5,253,066 (VOGEL) 12 OCTOBER 1993, SEE ENTIRE DOCUMENT.	9, 23
A,P	US, A, 5,353,121 (YOUNG ET AL) 04 OCTOBER 1994	1-32
A	US, A, 4,706,121 (YOUNG) 10 NOVEMBER 1987	1-32
A	US, A, 4,388,645 (COX ET AL) 14 JUNE 1983	1-32
A	WO, A, 92/04801 (YOUNG ET AL) 19 MARCH 1992	1-32



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US95/15241		(81) Designated States: AU, BR, CA, JP, MX, SG, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).	
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(74) Agents: RIZZI, Steven, J. et al.; Weil, Gotshal & Manges, 767 Fifth Avenue, New York, NY 10153 (US).			

(54) Title: ELECTRONIC TELEVISION PROGRAM GUIDE SCHEDULE SYSTEM AND METHOD WITH DISPLAY AND SEARCH OF PROGRAM WITH ALPHABETICAL TITLE LISTINGS

**TV**  
GUIDE

▲

A-List

A-Team

A.Hitchcock

A.Hitchcock

A.Hitchcock

A.M. Weather

ABC News

ABC News

▼

TITLE: A D      

To search index below, press **OK**

COM 47 11PM	
KCAL 9 Tmrw 2AM	
NIK 48 Tmrw 1AM	
SCIFI 42 Tmrw 4:30PM	325
SCIFI 42 Tmrw 8:30PM	
KCET 28 Tmrw 5:30AM	
KABC 7 6:30PM	
KABC 7 Tmrw 5:30AM	

## (57) Abstract

An electronic program schedule system which includes a receiver for receiving broadcast, satellite or cablecast television programs for a plurality of television channels and a tuner for tuning a television receiver to a selected one of the plurality of channels. A data processor receives and stores in a memory television program schedule information for a plurality of television programs to appear on the plurality of television channels. A user control apparatus, such as a remote controller, is utilized by a viewer to choose user control commands and transmit signals in response to the data processor which receives the signals in response to user control commands. A television receiver is used to display the television programs and television program schedule information. A video display generator is adapted to receive video control commands from said data processor for generating and displaying a plurality of television program titles on said television receiver, said plurality of television programs displayed alphabetically by title. A selection means is provided for allowing to select a title for display on said television receiver by selecting the n characters of said title.

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Electronic Television Program Guide Schedule System and Method  
with Display and Search of Program with Alphabetical Title Listings

Background of the Invention

This invention relates to an electronic program schedule system, which provides a user with schedule information for broadcast or cablecast programs viewed by the user on a television receiver. More particularly, it relates to an improved electronic program guide that provides the user with a more powerful and convenient operating environment, while, at the same time, increasing the efficiency of navigation by the user through the guide.

Electronic program guides for television systems are known in the art. For example, one prior system used an electronic character generator to display textual schedule information on the full screen of a television receiver. Other prior systems presented electronically stored program schedule information to a user for viewing while allowing the user to select display formats. Still other systems employed a data processor to input user-selection criteria, then stored only the program schedule information meeting these criteria, and subsequently used the stored information to automatically tune a programmable tuner or activate a recording device at the time of broadcast of the selected television programs. Such prior systems are generally discussed in "Stay Tuned for Smart TV," published in the November 1990 issue of *Popular Science*.

Collectively, the prior electronic program systems may be difficult to implement and cumbersome to use. They also fail to provide viewing capabilities that address in a more realistic manner the viewing habits of the users of these electronic program systems. Moreover, many of these systems are complex in their design and are expensive to implement. Ease of use and economy are primary concerns of television program distributors and viewers as they contemplate dramatic increases in the number and nature of program networks and other television-based services. And, as the number of television channels available to a user increases dramatically with the advent of new satellite and cable-based technologies, the utility of these prior systems substantially diminishes.

These prior-art systems also fail to provide the user with sufficient information, for example pricing and the like, about pay-per-view events, premium services or other packaged programming to which the user does not subscribe, nor

do they provide the user with the capability to automatically purchase such programming on demand or impulse. Moreover, these prior-art systems are deficient in that they fail to provide an efficient and automatic method of updating or replacing the application software programs that implement the electronic guide  
5 at the user sites, relying instead on manual or other cumbersome forms of revision or replacement or hardware-based systems that can not be updated without physical replacement of integrated circuits and/or other parts.

Nor do these prior electronic guide systems have the capability of linking the user to other applications or information systems which are not part of  
10 the electronic program guide application or data.

Nor do these prior electronic guide systems provide video promotion of television programs and services that are functionally linked and visually displayed in an integrated fashion. Program promotion is an important element of the effective marketing of television programming. The promotion of pay-per-view  
15 pay (i.e., "a la carte") programs and other unregulated program services is particularly important to cable television operators in the wake of re-regulation by the federal government. The current method of promoting such programming using video is through dedicated "barker" channels that use full screen continuous trailers (i.e., previews) which may or may not be accompanied by prices and ordering  
20 information. Recently, such promotional videos have been shown in split screens where part of the screen shows general schedule information for a time period roughly corresponding to the time period during which the general program being promoted is shown. Accordingly, there exists a need for an electronic program guide which can provide improved display and linking of video promotions with  
25 program schedule information and order processing functions.

The prior electronic program guides also fail to provide the user with a simple and efficient method of controlling access to individual channels and individual programs. The amount of adult situations involving sex and violence has steadily increased during the last 40 years. The issue of how this affects children or  
30 other viewers has gained national attention. Providing a parent with the ability to lock-out a channel is a well known and widespread feature of certain television receivers and cable converter boxes. Despite this availability, the feature is seldom used by parents. The main impediments to its effective use are the cumbersome

ways in which it is generally implemented, as well as the requirement that entire channels be blocked in order to block access to any objectional programming. A channel-oriented parental lock is unfair to other programmers on the blocked channel -- who, for example, offer adult-oriented programming in the evening and youth-oriented programming the following morning-- and inconvenient for viewers who want access to such programs. Thus, there is a particular need for a system which provides password control to individual programs and channels using a flexible and uncomplicated on-screen user interface.

The prior electronic program guides are also deficient in that they do not provide the user with the ability to view on demand current billing status and, thus, a need exists for a system which can provide the user with current billing information on the user's demand.

An additional problem with prior program guides is that when displaying schedule information in grid format, i.e., columns representing time slots and rows representing channels, program titles generally are width-wise truncated to fit into the cells of the grid. The width of a grid cell varies with the duration of the program. Since a 30 minute program is allotted only a small amount of space for the program title and description, titles and/or descriptions for half and even full hour programs often must be truncated in order to fit into the allotted space. Some systems simply cut off the description of a program without abbreviating it in any way, such that the user is unable to determine the subject matter of the program. For example, a recent television program display included the following text in a grid cell: "Baseball: Yankees v." Although some systems partially alleviate this problem by providing two lines of text in each grid cell, this solution is not ideal because program descriptions may still be truncated.

A similar problem arises as the time slots change, either automatically or in response to a user control command. Typically, 90 minutes of schedule information is displayed at one time and the 90 minute window is shiftable in 30-minute increments. In the case where a 30 minute shift causes a 30 minute size grid cell to display, e.g., a two-hour movie, it is likely that the full title of the movie will not fit into the cell. Truncation of the title is thus required in this situation as well. In this case, while two lines of text may be desirable to fit the title in the 30

minute cell, the 60 and 90 minute cells may require only one line of text to display the title.

The prior electronic program guides also lack a method for creating a viewing itinerary electronically while still viewing a program currently appearing on the television receiver. Moreover, these prior program guides leave much guess work for the user as he navigates through a sequence of channels. When skimming through channels to ascertain the program then being displayed on any channel, commonly known as "channel surfing," the user needs to guess which program is currently being aired from the video encountered as the user surfs through the channels. Since much -- in some cases, up to 30% -- of the programming appearing on any given channel at any given time is advertising or other commercial programming, the user is not provided with any clues as to what program is appearing on a selected channel at a given time and must therefore wait until the advertisement or commercial is over before ascertaining the program then appearing on the selected channel. Thus a need exists for a program guide which displays current program schedule information for each channel as the user surfs through the available channels.

Prior art program guides also lack a means for locating a television program where only the title of the program, movie, or event is known.

Accordingly, there is a need in the art for a simplified electronic program schedule system that may be more easily implemented, and which is appealing and efficient in operation. There is also a need to provide the user with an electronic program schedule system that displays both broadcast programs and electronic schedule information in a manner not previously available with other electronic program schedule systems, particularly those using a remote controller.

For example, there is a particular need for a flexible program schedule system that allows a user to view selected broadcast programs on a portion of the screen of the television receiver while simultaneously viewing program schedule information for other channels and/or services on another portion of the screen. There is also a need for such a program schedule system that permits the user to select from a plurality of selectable display formats for viewing the program schedule information. It is also preferred to have a system that indicates to the user those keys on the remote controller that are active in any particular mode of

operation. There also exists a need for such a system that will give a user the capability to set a programmable reminder for viewing a program scheduled to air at a future time.

There is also a need for an electronic guide system providing the user with comprehensive information about pay-per-view events, premium services or other packaged programming to which the user does not ordinarily subscribe, and which provides the user with the capability to automatically purchase such programming on demand or impulse. There is also a need for an electronic guide system providing a reliable and efficient method of updating or replacing the application software that implements the electronic guide at the user sites.

There also exists a need for an electronic program guide that operates as a shell or window to provide the user with the capability to access other applications or information systems that are not part of the electronic program guide application or data.

It is accordingly an object of the present invention to provide a system that will allow the user to view a broadcast program while, at the same time, interactively viewing program schedule information for other programs.

It is another object of the present invention to provide the user with the ability to select from among a plurality of display formats for the program schedule information.

It is yet another object of the present invention to indicate to the user of the program schedule system those keys on the remote controller active in the particular mode of operation of the system at the time of use.

It is a still further object of the present invention to provide the user of the electronic program schedule system with the capability of setting programmable reminder messages for any future program.

It is yet a further object of this invention to provide the system user with comprehensive information about pay-per-view events, premium services or other packaged programming to which the user does not subscribe and the capability to automatically purchase such programming on demand or impulse.

It is another object of the present invention to provide an electronic guide system that provides a reliable and efficient method of updating or replacing

the application software programs that implement the electronic guide at the user sites.

It is still another object of the electronic program guide to operate as a shell or window to provide the user with the capability to access other application  
5 or information systems which are not part of the electronic program guide application or data.

It is yet another object of the electronic program guide to provide a system whereby video promotion of television programs and services are functionally linked and visually displayed in an integrated fashion to facilitate the  
10 marketing and sale of such programs and services.

It is still a further object of the present invention to provide password control for access to individual programs, as well as channels, using a protected interactive flexible and uncomplicated on-screen interface.

Another object of the present invention is to provide the user with  
15 current programming information for all programs as the user surfs through the available channels.

It is yet a further object of the present invention to provide a system in which the user can access his current billing information on demand.

It is another object of the present invention to provide a system which  
20 overlays television program listings against varying background views.

It is yet another object of the present invention to provide an improved display of text in the grid cells comprising a page of television program listings.

It is another object of the invention to provide a system where the  
25 user can locate a television program, movie or event by selecting the first several characters of the title of the program, movie, or event.

These and other objects of the invention are achieved by an electronic program schedule system which includes a receiver for receiving broadcast, satellite or cablecast television programs for a plurality of television channels and a tuner for  
30 tuning a television receiver to a selected one of the plurality of channels. A data processor receives and stores in a memory television program schedule information for a plurality of television programs to appear on the plurality of television channels. A user control apparatus, such as a remote controller, is utilized by a

viewer to choose user control commands and transmit signals in response to the data processor which receives the signals in response to user control commands. A television receiver is used to display the television programs and television program schedule and other information. A video display generator receives video control commands from the data processor and program schedule information from the memory and displays a portion of the program schedule information in overlaying relationship with a television program appearing on a television channel in at least one mode of operation of the television programming guide. The data processor controls the video display generator with video control commands, issued in response to the user control commands, to display program schedule information for any chosen one of the plurality of television programs in overlaying relationship with at least one television program then appearing on any chosen one of the plurality of channels on the television receiver.

#### Brief Description of the Drawings

Fig. 1 is a block diagram showing various components of the preferred embodiment of the invention herein.

Fig. 2 is a block diagram showing the combination of program and schedule information by the video overlay device utilized in the preferred embodiment of the invention.

Fig. 3 depicts a remote controller that can be used in connection with the preferred embodiment of the electronic program guide system of the present application.

Fig. 4 depicts an alternative embodiment of the remote controller shown in Fig. 3.

Fig. 5 shows an overlay appearing on a television screen in one mode of operation of the preferred embodiment of the present invention.

Fig. 6 is a menu that appears on a television screen in a MENU mode of operation of the preferred embodiment of the present invention.

Fig. 6A is yet another menu that appears on a television screen in a MENU mode of operation of the preferred embodiment of the present invention.

Fig. 7 depicts a Viewer Preference Menu that appears on a television screen in one aspect of the preferred embodiment of the present invention.

Fig. 8 shows a Preferred Channel selection submenu.

Fig. 9 shows an impulse ordering menu that appears on a television screen in one aspect of the preferred embodiment of the present invention.

Fig. 10 shows a Premium Services submenu that appears in one mode of operation of the preferred embodiment of the present invention.

Fig. 11 shows a graphic overlay appearing on a television screen in a BROWSE mode of operation of the preferred embodiment of the present invention.

Fig. 12 shows a graphic overlay appearing on a television screen in a BROWSE mode of operation of the preferred embodiment of the present invention having different information from that shown in Fig. 11.

Fig. 12A shows a graphic overlay appearing on a television screen in a BROWSE mode of operation in the present invention displaying schedule information for a time and channel other than that shown in Fig. 11.

Fig. 13 shows a graphic overlay appearing in a REMINDER mode of operation of the preferred embodiment of the present invention.

Fig. 14 shows yet another graphic overlay appearing in a REMINDER mode of operation of the preferred embodiment of the present invention.

Fig. 15 is yet another menu that appears on a television screen in a MENU mode of operation of the preferred embodiment of the present invention.

Fig. 16 is yet another menu that appears on a television screen in a MENU mode of operation of the preferred embodiment of the present invention.

Fig. 17 is yet another menu that appears on a television screen in a MENU mode of operation of the preferred embodiment of the present invention.

Fig. 18 shows a grid listing of schedule information displayed in an All Listings mode of operation of the preferred embodiment of the present invention.

Fig. 19 shows schedule information displayed in a Listings By Category mode of operation of the preferred embodiment of the present invention.

Fig. 20 shows schedule information displayed in a Listings By Channel mode of operation of the preferred embodiment of the present invention.

Fig. 21 shows information displayed in response to a user's request for supplemental programming information.



Fig. 22 shows programming, ordering and video promotional information displayed in a Pay-Per-View mode of operation of the preferred embodiment of the present invention.

5 Fig. 23 shows an ordering submenu used in conjunction with the mode of operation shown in Fig. 22.

Fig. 24 shows yet another ordering submenu used in conjunction with the mode of operation shown in Fig. 22.

Fig. 24A shows yet another ordering submenu used in conjunction with the mode of operation shown in Fig. 22.

10 Fig. 25 shows another grid listing of schedule information displayed in an All Listings mode of operation of the present invention.

Fig. 26 shows a Premium Services submenu that appears in one mode of operation of the preferred embodiment of the present invention.

15 Fig. 27 shows a Messages menu that appears in one mode of operation of the preferred embodiment of the present invention.

Fig. 28 shows exemplary messages used in connection with the menu of Fig. 27.

Fig. 28A is an alternative message menu.

20 Fig. 29 shows billing information used in connection with the menu of Fig. 27.

Fig. 30 shows a Key Lock Access menu that appears during one mode of operation of the preferred embodiment of the present invention.

Fig. 31 shows a menu appearing in connection with an Interactive Television mode of operation of the preferred embodiment of the present invention.

25 Fig. 32 shows information that appears in a Quote Watch menu in connection with the Interactive Television mode of operation shown in Fig. 31.

Fig. 33 shows other information that appears in connection with the Interactive Television mode of operation shown in Fig. 31.

30 Fig. 34 is a menu showing information that appears in a news display in the Interactive Television mode of operation of the preferred embodiment of the present invention.

Fig. 35 is a menu showing information that appears in a sports display in the Interactive Television mode of operation of the preferred embodiment of the present invention.

5 Figs. 36A-D illustrate a flow chart showing the operation logic required for implementation of a computer program for the electronic program guide.

Fig. 37 is a menu showing a Locator screen for locating channel numbers and defining favorite channel lists.

10 Fig. 38 is an alternative menu that can be used in a MENU mode of operation of the electronic program guide.

Fig. 38A and 38B show, respectively, an alternative main menu screen and a listing-by-time screen accessible from the alternative main menu.

Fig. 38C is a second alternative menu screen including the "By Title" selection box.

15 Fig. 38D shows a screen of alphabetical listings displayed upon selection of the "By Title" option.

Fig. 38E illustrates the scroll mode of one embodiment of the "By Title" option of the present invention.

20 Fig. 38F illustrates the search mode of one embodiment of the "By Title" option of the present invention.

Fig. 39 is a Lockout menu that alternatively can be used for permitting or prohibiting access to certain programs.

Fig. 40 is a Setup menu that can be used to set text location and a purchase code for premium and pay-per-view programming.

25 Fig. 40A shows an exemplary menu for inputting a lockout code.

Figs. 40B through 40E show, respectively, exemplary menus for entering, confirming, clearing or changing a purchase code.

Fig. 41 is a Lockout Verify menu that is used in connection with the Lockout menu of Fig. 39.

30 Fig. 42 is a flow chart showing the operation of the preferred embodiment of the textfit system of the invention herein.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

### System Configuration

Fig. 1 is a block diagram showing various components of the electronic program schedule system generally designated as 10. Physically, these system components can be located in a user's set-top cable converter box or other signal reception or processing device, such as a satellite receiver. Alternatively, the components can be mounted in a separate housing, or included as part of a television receiver, VCR, personal computer, or multimedia player; or reside as a distributed application in a broadband network architecture.

10 An input signal 11 is connected to a receiver 12, which receives a transmitted data stream from a data provider. The data stream may contain, for example, information about programs or services available in a particular market, geographical or otherwise. The input signal 11 can originate, for example, as part of a standard broadcast, cablecast or satellite transmission, or other form of data transmission. The data provider is a program information provider, the satellite uplink manager, a local cable operator, or a combination of these sources, and the data stream contains program schedule information for all television programs and other services available in the operator's geographical market.

20 The data stream may be modulated and then transmitted on the cable line in any number of ways, including as part of a dedicated channel transmission operating at a frequency of, for example, 75 MHz. Those of skill in the art will understand that numerous other transmission schemes can be used to transmit the data stream, such as embedding it in the vertical blanking interval of a program broadcast signal. As will be discussed in greater detail below, according to the present invention, the transmitted data stream may additionally contain application software for implementing or updating the electronic program guide at the user site.

25 The transmitted program schedule data or application software is received by the receiver 12 on signal input line 11. The received signal is passed from the receiver to a data demodulator 13, such as a QPSK demodulator or a GI Info-Cipher 1000R, which demodulates the transmission and passes it to a buffer 15.

30 A microcontroller 16, such as a M68000EC, receives data passed to the buffer 15. Bootstrap operating software, which may be used for capturing electronic program guide application software updates, is stored in a read only

memory (ROM) 17. The microcontroller 16 uses the received program schedule information to build a database by storing the data in appropriately organized records in dynamic random access memory (DRAM) 18. The stored schedule information can be updated on a periodic basis, such as hourly, daily or weekly, or  
5 at any time when changes in scheduling or other factors warrant an update. The system also includes a system clock 19.

Alternatively, the program schedule information could be supplied in a ROM, disk or other non-volatile memory, or it could be downloaded to a storage disk or other data storage device. The invention herein is not directed to the  
10 particular method of transmission or reception of the schedule information.

If the microcontroller 16 recognizes the received data as application software which controls the program schedule system, as opposed to program schedule information, it stores it in non-volatile memory, such as an electrically erasable programmable ROM (EEPROM) 20 or battery-backed static RAM  
15 (SRAM). This configuration allows revised or replacement versions of the application software to be downloaded directly from the software developer to the user site through the cable or other transmission system.

In the case where an EEPROM is utilized, revised or replacement versions of the application software downloaded from the developer are first stored  
20 in DRAM 18 by the microcontroller 16, under direction of the downloading operating software stored in the ROM 17. The stored application software can then be checked for accuracy by, for example, a checksum analysis or other verification routine.

After the accuracy of the application software has been verified, the  
25 microcontroller 16 initiates a routine to re-program the EEPROM 20, where the application software is permanently stored. The microcontroller 16 will issue proper control commands to a reprogram circuit 21, which is adapted to supply the proper program voltage and logic control signals 22 required to erase and write to the EEPROM. It supplies this program voltage,  $V_{prog}$ , as well as any other  
30 required control signals, such as read or write enable, to the EEPROM 20 upon command from the microcontroller 16. After the EEPROM 20 has been electrically erased, the microcontroller 16 initiates transfer of the new application software from the DRAM 18 to the EEPROM 20 for storing.

When a battery-backed SRAM is utilized as non-volatile memory, the microcontroller stores the revised or replacement version of the application software downloaded from the developer directly in the SRAM, again under direction of the downloading operating software stored in the ROM. The stored  
5 application software can then be checked for accuracy by, for example, a checksum analysis or other verification routine.

When power is first applied to the system 10, the bootstrap operating software verifies that the program guide application software is resident in memory. If it is not resident, the bootstrap operating software waits for a download of the  
10 software. Once the application software is resident, the microcontroller 16 executes the application program software from a dedicated portion of the DRAM 18. Alternatively, the application software can be executed directly from the non-volatile memory 20. Under control of the program guide application software, the microcontroller 16 first verifies that the program schedule information is resident in  
15 DRAM 18. If it is not resident, the microcontroller waits for a download of the program schedule information, as discussed above. Alternatively, if the application program is resident in memory, but the database records containing the program schedule information data are not yet available, the application software can be configured to carry out other tasks, such as allowing the user to carry out functions  
20 not requiring the program schedule information data, as well as displaying an appropriate message indicating the database data is not yet available.

When the schedule system is operating, as discussed in greater detail hereinbelow, the microcontroller 16 takes the program schedule information stored in the DRAM 18 and, in conjunction with other downloaded data types such as  
25 stored bit maps for the screen configuration and the graphic symbol or logo displays stored in non-volatile memory 20 or, alternatively, in DRAM 18, supplies it to a video display generator (VDG) 23, which in the present embodiment may be a commercially available VGA-type graphics card, such as a Rocgen card manufactured by Roctec. The VDG includes a standard RGB video generator 24,  
30 which takes the digital program schedule information sent by the microcontroller 16 and converts it to an RGB format in accordance with the bit map for the particular screen display then being presented to the user on the television receiver 27. The

configuration of each screen is shown and discussed in greater detail in the System Operation section below.

The VDG also includes a Video Overlay Device 25, which accepts the RGB video input, as well as an input from conventional television tuner 28, such as a conventional tuner manufactured by General Instrument or a Jerrold DP1 tuner, which supplies a program signal in standard NTSC video format. The overlay device 25 converts and combines the RGB signal with the signal from the tuner 28, and produces a composite NTSC output signal containing both the program signal and the program schedule information, as shown in Fig. 2. This composite video signal is supplied to a modulator 26, shown in Fig. 1, which can be a modulator such as available from Radio Shack, and then to the television receiver 27, which the user keeps tuned to the modulated channel, for example, channel 3 or 4. The composite video signal can also be supplied directly to the television receiver 27 or other receiving device from the VDG through a video port 25A on the VDG.

The system components identified in connection with Fig. 1 can all be implemented in a preferred platform by, for example, an IBM personal computer equipped with a transmission link and a video graphics card, such as those manufactured by Roctec. Other platforms, such as a cable converter box equipped with a microprocessor and memory, or a broadband network also could be used. Examples of the particular components are as follows: Microcontroller -- Motorola part no. MC68331-16; ROM -- Texas Instruments part no. TMS27PC512; DRAM -- Texas Instruments part no. TM4256; EEPROM -- Intel part no. 28F001BX-T. In any event, those of skill in the art will appreciate that the particular details of the hardware components and data storage are a function of the particular implementation of the system, and are not the subject of the present invention.

As discussed in detail below, the user may navigate through the program schedule system with a remote controller, such as that shown in Fig. 3, which operates on conventional principles of remote control transmitter-receiver logic, such as by infrared or other signalling, or other suitable user interface. The remote controller 31 communicates with the microcontroller 16 through the remote controller receiver 29, shown in Fig. 1, which can be a Silent Partner IR receiver, and which receives signals transmitted by the remote controller 31 and supplies the

microcontroller 16 with a corresponding digital signal indicating the key depressed by the user.

A remote controller suitable for the present invention, such as shown in Fig. 3, which can be a remote controller manufactured by Universal Electronics or Presentation Electronics' Silent Partner, may include a power switch 32, volume 5 33 and mute 34 controls, an ENTER or key 35, 0-9 digit keys 36, four direction arrow keys 37A and 37B, a MODE key 38 and an information key 39 that is designated with a lower case "i." The power 32, volume 33 and mute 34 keys operate in the same manner as conventional remote controllers typically used with 10 present-day television receivers. The numeric digit keys 36 also function in much the same manner as conventional remote controllers. A brief description of the remaining keys follows.

The MODE key 38 takes the user through various layers of the electronic program schedule system 10 and generally allows the user to return to a 15 previous screen when he is in a submenu. The up/down direction arrow keys 37A allow a user to navigate through the different TV program channels when the program schedule system is in a FLIP or BROWSE mode, as will be fully described below, and also allow the user to navigate through highlighted bars displayed on the TV screen when in a MENU mode. The left/right direction arrow keys 37B allow 20 the user to navigate through selected time periods when the program schedule system is in the BROWSE mode, as will also be described below. They further allow the user to navigate across subject-matter categories while in the "Categories" submenu of the MENU mode, as well as to navigate across time periods when the program schedule system is in a pay-per-view ordering mode and, in general, 25 navigate in left or right directions to select various icons and other objects. The information, or "i," key 39 allows the user to view supplemental program and other information during the various modes of the program schedule system. The ENTER 35 key fulfills and inputs a command once the user has made a selection from the remote controller keys. The function and operation of these keys will be made 30 more apparent in the detailed discussion of the FLIP, BROWSE and MENU modes below.

A second embodiment of the remote controller 40 is shown in Fig. 4. This embodiment of the remote controller also includes a power key 41, numeric

digit keys 42, direction arrow keys 43A and 43B, information key 48, ENTER or SELECT or "OK" key 44, volume control 45, lockout key 45A, mute keys 46 and help key 48A. It also includes pound sign and star keys.

This embodiment of the remote controller further includes a number  
5 of icon keys 47A and 47B, which correspond to different submenus or modes of the program schedule system. The icons 47A and 47B may also be displayed on the TV screen when the program schedule system is operating. The icon keys essentially replace the MODE key 38 used in the embodiment of the remote controller shown in Fig. 3. Using these keys, the user can move from one mode to  
10 another simply by depressing the icon key corresponding to the desired mode of operation of the program schedule system. In the embodiment of Fig. 4, the icons 47A and 47B are shown as graphic symbols situated directly above a corresponding color-coded key. Alternatively, the color-coded keys could be eliminated and keys could be formed in the image of the icon itself.

15 The embodiment of the remote controller shown in Fig. 4 also includes three color-coded viewer preference or favorite channel keys, 48A, 48B and 48C that are situated directly above the icon keys. Each of these keys indicate to the program schedule system a distinct user-created "Channel Preference" or "Favorite Channel" list, which is a listing of a specific subset of channels for a  
20 particular user, arranged in the sequential order that the user wishes to view during operation of the program schedule system. The creation of the Channel Preference or Favorite Channel list is discussed in the following section. Thus, the system provides for at least three individual channel subsets for three individual users.

The remote controller of Fig. 4 also may be equipped with a "HELP  
25 key 48A, which, when depressed, causes the microcontroller 16 to retrieve previously stored instruction messages from memory and cause them to be displayed on the television receiver 27. These messages offer help to the user in the form of instructions that guide the user through the operation of the various operating mode of the electronic television program guide. They may be text messages, or  
30 instructional video images, or audio programs, depending on the storage capacity of the system, or any combination of these. Moreover, these help messages may be created so that they are context-sensitive, i.e., the messages displayed depend entirely upon the precise point in the operation of the electronic program guide that



the user depresses the help key 48A. For example, information could be supplied for operation of the remote controller, for operating the FLIP or BROWSE mode (discussed below), or any other mode of operation of the guide, for impulse ordering, for setting a lockout, etc. In order to accomplish this, each point of operation of the guide could be coded so that the microprocessor could track the current operating point, for example, by temporarily storing the code reflecting the present operating point as the user operated the guide. When the user pressed the help key 48A, the microcontroller 16 would retrieve an appropriate set of messages based on the presently stored operating point code. Additionally, the i key 39 could be used to carry out the function of the help key.

Additionally, each of the functions of the remote controllers can also be integrated into a keypad on the user's cable box or other hardware.

### System Operation

In operation, the electronic program schedule system of the present invention functions as follows.

### FLIP Mode

When the user is viewing a particular program channel on the television receiver, the program schedule system defaults to a FLIP mode, shown in Fig. 5. In this mode, a graphic overlay 51 containing programming information for the channel currently tuned on the tuner is superimposed in overlaying relationship with a received program signal 55 on the screen of the television receiver 27 whenever the viewer changes the program channel, for example, by using the up/down direction arrows on the remote controller. The video overlay device 25, such as shown in Fig. 1, combines the computer-generated RGB video-graphic overlay information with the NTSC-format program signal from the tuner 28, and supplies an NTSC-format output signal, which includes the program signal from the tuner and the program schedule overlay information for viewing on the television receiver 27.

The programming information contained in the graphic overlay 51 is supplied to the RGB video generator by the microcontroller. In FLIP mode, the microcontroller first searches the program schedule database in, for example, the DRAM 18 to retrieve the programming information for the currently tuned channel

52 corresponding to the current time; i.e., the time at which the user just turned on the television receiver for viewing. The microcontroller 16 then supplies the current channel and program information to the RGB video generator 24 which converts the digital data information to RGB format and supplies it to the video overlay device 25.

In normal operation, the microcontroller 16 defaults to displaying all channels offered by the cable company prioritized by numeric order, which is determined by the broadcast channel position in the radio spectrum or the marketing judgments of local cable operators. Using a "Channel Preference" submenu, or an alternative "Locator" screen, both of which are discussed below, the user can revise the content and/or sequential order of the channels presented to the television receiver 27.

In general, if the user does not issue a change-channel instruction, or other command, from the remote controller 40 within a predetermined time interval while in the FLIP mode, the microcontroller 16 instructs the VDG 23 to remove the graphic overlay 51 from the television receiver, thus presenting only a program signal 55 to the television receiver 27 for viewing. The duration of the predetermined time interval is such that it allows the user sufficient time to read the programming information contained in the overlay. The duration of the predetermined time interval during which the graphic 51 overlay appears is stored in a location in non-volatile memory 20 addressable by the microcontroller 16. The user can change the duration of the time interval, by first entering a Viewer Preference mode, and then selecting an "overlay interval" entry. The microcontroller 16 then causes a user prompt to be displayed on the screen which, for example, asks the user to select an appropriate time period for displaying in the graphic overlay on the screen. Using the numeric keys, the user can input an appropriate response, for example, a period between 5 and 60 seconds, and then depress ENTER. The new interval period is then read and stored by the microcontroller 16 in the overlay time interval location in memory.

If the user issues a change-channel command from the remote controller 40 before or after the predetermined overlay period has elapsed, either by using the up/down direction arrows 43A, or by entering a desired channel number using the numeric keys 42 and then depressing the ENTER key 44, the

microcontroller 16 will cause the tuner 28 to tune to the desired channel -- either the channel immediately preceding or following the current channel when the up or down arrow 43A is used or the specific channel entered on the numeric key pad by the user -- and will also search for and immediately cause to be displayed the  
5 current program information for that channel. Thus, as the user flips through the channels, the program schedule information for any selected channel automatically appears in the graphic overlay 51 while the actual program 55 appearing on the selected channel at the particular time occupies the remainder of the screen.

The system can also be configured to issue an error message, such as  
10 an audible beep or displayed text indicating an invalid key stroke, if the user depresses either the left or right direction arrow keys while in the FLIP mode.

### BROWSE Mode

To initiate the BROWSE mode, the user depresses the MODE switch  
15 once while in the FLIP mode when using the first embodiment of the remote controller 31 shown in Fig. 3. Utilizing the second embodiment of the remote controller 40 shown in Fig. 4, the user would depress the button below the BROWSE icon 47A.

In the BROWSE mode, the user is provided with the ability to scan  
20 through program schedule information for any channel, including, but not limited to, the channel being viewed, while at the same time continuing to view the TV program previously selected. As shown in Fig. 11, in this mode the graphic overlay information that appears in the FLIP mode is replaced with programming information for the channel being browsed, which may or may not be the channel  
25 currently being viewed by the user. After the user issues the command from the remote controller 40 to enter the BROWSE mode, a graphic overlay 111 is generated, as in the FLIP mode, with program schedule information for the currently tuned channel 112 and a textual BROWSE indicator 113 to remind the user of the currently active mode, as shown in Fig. 11.

30 If the user depresses either the up or down direction arrow on the remote controller 40 while in the BROWSE mode, program schedule information for either the prior or next channel is displayed in the graphic overlay portion 111 of the television receiver screen 27, while the tuner remains tuned to the channel

program that appeared on the television receiver at the time the user entered the BROWSE mode, as shown in Fig. 12, and continues to so appear. Each successive depression of the up or down direction arrow key produces corresponding program schedule information for the selected channel. The graphic overlay may also  
5 include a small video window for showing the actual video signal of a currently aired program or a clip of a future program corresponding to the schedule information then appearing in the BROWSE overlay. In this way, the user can simultaneously scan program schedule information for all channels while continuously viewing at least one selected program on the television receiver. With  
10 the advent of sophisticated television receivers, it may also be possible to simultaneously display multiple broadcast programs on a single screen for viewing, or to split the screen to show, for example, broadcast programs in combination with advertisements. The BROWSE feature could be used in any of these situations.

If, at any time during scanning of the program schedule information  
15 in the BROWSE mode, the user desires to tune the television receiver 27 from the program channel currently being viewed to the program channel indicated in the schedule information in the graphic overlay, he simply depresses the ENTER button 44 and the tuner 28 will be tuned to that channel. If the user does not want to view another channel and wishes to exit the BROWSE mode, thus removing the graphic  
20 overlay 111 with the program schedule information, he must depress the MODE key twice in the first embodiment of the remote controller 31. The first depression of the MODE key takes the user to the MENU mode, discussed below, and the second depression will take the user to the FLIP mode. Once in the FLIP mode, the graphic overlay will be removed after the duration of the time-out interval has  
25 passed. In the second embodiment of the remote controller shown in Fig. 4, the user toggles the BROWSE icon key to deactivate the BROWSE mode.

When the user first enters the BROWSE mode and begins scanning channels, the schedule information appearing in the overlay portion 111 describes the programs currently playing on any particular channel. In order to view  
30 programming information for later or earlier times, the user employs the left and right direction arrows 43B. As a consequence, the system will display future program schedule information for the particular channel previously selected by the up and down direction arrows, whether it is the channel currently being viewed or

any other available channel. The schedule information presented includes the name of the program and program start/stop time. The instant embodiment of the system, in order to conserve memory, will not allow the user to view programming information for a time prior to the current time. The system could be easily  
5 modified to provide such information if adequate memory is made available. It may be desirable, for example, to allow a user to view schedule information for an earlier time to find a particular show and then allow the user to command the microcontroller to find and display future airing dates of the show, or the microcontroller could simply do this automatically.

10 When viewing program schedule information for a future time in the BROWSE mode, the displayed time of airing 121 of the particular show 122 is highlighted, as well as the channel number and service indicator 123, as shown in Fig. 12A. Such highlighted information reminds the user that he is viewing program schedule information for a future time. Also, when viewing program  
15 schedule information for a future time on any particular channel in the BROWSE mode, depression of the channel up direction arrow key on the remote controller 40 causes programming schedule information for the next channel to appear, which corresponds in time to the future time that was being viewed before the up key was depressed by the user. The channel down direction arrow key 43B functions  
20 identically in this mode.

If while viewing program schedule information for a future time in BROWSE mode the user depresses the ENTER key on the remote controller, the microcontroller 16 will instruct the VDG 23 to display a REMINDER overlay message 130 which, as shown in Fig. 13, is displayed as a second overlay 131  
25 appearing above the BROWSE overlay 132. The REMINDER message 130 queries the user as to whether the system should remind the user, at a predetermined time before the start of the selected program, that he or she would like to view the selected program, as shown in Fig. 13. If the user responds affirmatively, the microcontroller 16 stores reminder data consisting of at least the channel, time and  
30 day of the selected program in a reminder buffer, which contains similar schedule information for all programs for which the user has set a reminder. At a pre-determined time before the selected program start time, for example, five minutes, the microcontroller 16 will retrieve schedule information, including title and service,

based on the reminder data, and will instruct the VDG 23 to display a REMINDER overlay message 140 on the television receiver 27, as shown in Fig. 14, to remind the user that he or she previously set a reminder to watch the selected program. The REMINDER message 140 contains the channel, service and start time. It also displays the number of minutes before the time of airing of the particular show and updates the display every minute until the time of airing. The REMINDER message 140 also displays a "TUNE" inquiry, which asks the user if she would like to tune to the selected program. When the user sets multiple reminders, the reminder overlays are stacked, for example, in ascending order according to the time each reminder is scheduled to be displayed, and the next reminder message will appear on the television receiver after the user takes appropriate action to remove the reminder message then being displayed. The REMINDER message (140 could also be adapted to allow the user to display or modify a list of all reminders previously set by the user. As with the overlay display time period in the FLIP mode, the user can modify the time period before a selected program that the REMINDER message appears by entering the Viewer Preference mode and revising the time entry.

### MENU Mode

Using the remote controller 31 shown in Fig. 3, the user can enter the MENU mode from the BROWSE mode or from the FLIP mode by toggling the MODE button 38 once or twice, respectively. Using the remote controller 40 of Fig. 4, the user would simply depress the key 47B corresponding to the MENU icon.

Referring to Fig. 6, in the MENU mode, the system displays a plurality of menu items and icons, which correspond to and allow user selection of distinct program schedule information display formats, local cable system message boards and other on-line information services. The MENU screen shown in Fig. 6 is a full-screen display. In the embodiment shown in Fig. 6, there are four vertically selectable horizontal bars 61-64, which are accessed using the up and down direction arrows 43A on the remote controller 31 or 40. At the extreme left of each bar, an identifying icon 61A-64A is displayed, which identifies the information contained in that bar. In the embodiment of Fig. 6, the "TV GUIDE" icon 61A in the first bar corresponds to program schedule information from TV

Guide® magazine, the "NOW SHOWING" icon 62A in the second bar 62 corresponds to pay-per-view and premium service events, the "MSO Logo" icon 63A in the third bar 63 corresponds to Customer Service or local cable company information messages, and the circular icon 64A in the fourth bar 64 corresponds to  
5 other interactive services available to the user, or in the case of broadband networks, other venues, e.g., home shopping, banking or telephone use. As also shown in Figs. 6 and 6A, each bar also contains a textual description of its contents.

When the user first enters the MENU mode, the system defaults to selection of the program schedule bar. When a particular bar is selected, the textual  
10 description is removed and a plurality of icons or identifying windows are displayed adjacent the identifying icon. In Fig. 6, the program schedule bar 61 is selected. Using the up or down direction arrow key on the remote controller 40, the user selects a vertically adjacent bar. Figs. 15-17 show, respectively, selection of the Pay-Per-View bar 62, the Customer Service or Messages bar 63 and the Interactive  
15 TV services bar 64.

An alternative MAIN MENU screen 215 is shown in Fig. 38. Certain selection screens accessible from the menu shown in Fig. 38 are shown in Figs. 38A and 38B. It has three horizontally selectable bars: program schedule 205, Home Theater 206 and Customer Service 207. The MAIN MENU screen 215 also  
20 contains an additional "Locator" identifier, which is described below.

A second alternate MAIN MENU screen 320 is shown in Fig. 38C. The MAIN MENU screen of Fig. 38C includes a "By Title" selection box 321 in addition to the "By Time" 322 and "By Channel" 323 selection boxes.

Once a particular bar in the MENU screen is selected, the user can  
25 select a particular icon from the plurality of horizontally selectable displayed icons 65A-65C by using the left or right direction arrow and the ENTER key on the remote controller 40. Each icon contains a graphical symbol appearing in a background window of a particular color. When a particular icon is selected, it is offset from its background window and the color of the window changes. In Fig. 6,  
30 the grid icon 65A immediately adjacent the "TV GUIDE" icon in the first bar 61 is selected.

The function corresponding to the selectable entries in the MAIN MENU screen will now be discussed with reference to Fig. 6. It will be

appreciated by those of skill in the art that the same functionality applies in the categories shown in the MAIN MENU 215 shown in Fig. 38.

In the uppermost vertically selectable horizontal bar 61, the first grid icon 65A represents an "All Listings" mode in which the program schedule information is displayed in a grid listing, such as that shown in Fig. 18. Alternatively, a single column grid-like display could be used, as that shown in Fig. 25. In this format, the vertical y-axis identifies the channel number and service while the horizontal x-axis identifies the time. The screen display of Fig. 18 also contains in the upper left-hand corner a mode identifier 180, in this case the notation "All Listings," to remind the user of the current operating mode of the system. Directly underneath the mode display is a highlighted display 181 of the channel the user was watching before entering the MENU mode. In the upper right-hand corner, a logo icon 182 appears in a window directly above a date/time identifier 183, which alternatively displays the current date and time.

In the center of the screen display shown in Fig. 18 is a graphical Active Key Display (AKD) 184 which indicates to the user those keys on the remote controller that are active for that particular mode of the program guide display system. For example, in the screen display of Fig. 18, the cursor can only move up, down or to the right. If the user were to depress the left direction arrow key on the remote controller at that point, the system would not carry out any function since the cursor can not move to the left. Thus, the left arrow key is not active so its image is not displayed on the AKD 184. Similarly, since the system will only respond to a depression of the up, down or right direction arrow keys and the ENTER key, they are the only key images displayed on the graphical AKD 184. The MODE key, though not displayed, is always active to change from one mode to another. When the user first enters the All Listings guide, the time listing begins by default at the half-hour immediately preceding the current time unless the current time is on the hour or half-hour, in which case the display begins with the particular hour or half-hour, and the channel listing begins at the last channel being viewed by the user before entering the MENU mode. For example, in Fig. 18, the current time is displayed as 7:13 p.m., the time listing begins at 7:00 p.m. and the channel listing begins with channel 4.



In the All Listings mode, a moveable highlighted cursor 185 is used to indicate the currently selected program to the user. The user manipulates cursor movement using the direction arrow keys on the remote controller 40.

Furthermore, the entire information display pages upward if the cursor is placed at the bottom of the screen and the down direction arrow is depressed, and similarly  
5 the bottom of the screen and the down direction arrow is depressed, and similarly  
pages to the left if the cursor is at the extreme right side of the display and the right  
direction arrow is depressed. In this way, the user can navigate through the entire  
program schedule.

The folder icon 65B immediately to the right of the All Listings icon  
10 in the top horizontal bar 61 of Fig. 6 identifies a "Category Listing" mode in which  
program schedule information is displayed and categorized by program content, as  
shown in Fig. 19. The particular listing shown in Fig. 19 includes the categories of  
Movies, Sports, News and Children 190A-190D. The database record stored for  
each listing contains a content-specific identifier so the microcontroller can search  
15 the database and categorize the information by content for purposes of displaying it  
in the Category Listing mode. As shown in Fig. 19, the user can manipulate the  
cursor left or right to highlight any one of the categories which appear at the head  
of the listing. In Fig. 19, the "Movies" category 190A is selected. As shown, the  
user is given a display of all movies, prioritized by time and then alphabetically by  
20 title of show, beginning with the half-hour immediately preceding the current time  
unless the current time is on the hour or half-hour, in which case the display begins  
with the particular hour or half-hour. The screen display shown in Fig. 19 also  
includes a textual description of the current operating mode of the program schedule  
system, as well as the graphic AKD 184, similar to that used in connection with the  
25 All Listings mode.

As with the All Listings mode, if the user highlights a show which is  
currently airing, he can immediately tune to that show by depressing the ENTER  
key on the remote controller 40. If the highlighted show is one that will appear at  
future time, the user is again given the option of setting a REMINDER message.

30 The triangular icon 65C at the far right of the TV GUIDE bar 61 in  
the display of Fig. 6 identifies a "Channel Listing" mode in which the program  
schedule information is categorized and displayed by channel, as shown in Fig. 20.  
The screen display shown in Fig. 20 again includes a textual mode identifier 201,

the graphic AKD 184, and the window including the logo icon 182 and alternating time/date display 183. At the head of the program listing is a list of several consecutive channels 202A-202C beginning with the last channel viewed by the user before entering the Channel Listing mode. The channel in the middle window 202

5 is highlighted and is the channel for which schedule information is displayed. The display identifies those programs appearing on the highlighted channel beginning with the half-hour immediately preceding the current time unless the current time is on the hour or half-hour, in which case the display begins with the particular hour or half-hour. The user can display further future listings by manipulating the cursor to the bottom of the screen and paging the display, as previously described. The

10 user can also change the selected channel by manipulating the left or right direction arrow keys on the remote controller 40. When the user issues a change-channel command in this manner, the next consecutive channel will be displayed in the highlighted window 202B in the channel string at the head of the display, and

15 schedule information for the newly selected channel will be displayed on the television receiver 27.

As with other modes, if a user wishes to tune to a highlighted program that is currently airing, he can do so by simply depressing the ENTER key on the remote controller 40, and if the user wishes to view a program that airs at a

20 future time, the user is again given the option of setting a REMINDER message. In each of the FLIP, BROWSE and MENU modes, a lower case "i" icon appears at various number of occasions in connection with certain program listings, such as movies, such as the "i" 203 shown in Fig. 20. Any time this icon appears, the user can view additional programming information, generally comprising a textual description

25 of program content and/or other information related to the program, such as the names of cast members and the like, by depressing the "i" key 48 on the remote controller 40. An example of a display of such additional information is shown in Fig. 21.

The second horizontal bar 62 appearing on the screen in the MAIN MENU mode shown in Fig. 6 is the "Home Theater" Listing. It

30 corresponds to Pay-Per-View events or services, specialized programming, and Premium Service programs. When this category is chosen by the user, the television receiver displays information as shown in Fig. 15. The first theater-ticket icon 150 that appears in this Home Theater bar identifies a format in which the Pa

Per-View events and premium services are displayed, as shown in Fig. 22. As with other modes, the user can manipulate the cursor to highlight and select any particular show. Also, the user can obtain additional information about the Pay-Per-View event or service by depressing the "i" key 48 on the remote controller 40.

- 5 The Pay-Per-View menu screen display shown in Fig. 22 also includes a video display section 220 in which short promotional clips of current and future events and services can be shown to the user while the user is viewing the Pay-Per-View scheduling information. The display of Fig. 22 is bit mapped such that the advertising clips may be shown in the lower left quadrant of the screen. The clips  
10 may be shown randomly in the video display section 120 or, alternatively, the clip shown could correspond to the particular selected entry on the list of events, and would change automatically as the user navigated through the list.

- When a user highlights a Pay-Per-View event or service by manipulating the cursor to the desired event or service using the direction arrow  
15 keys on the remote controller 40, he can order the event or service by depressing the ENTER button on the remote controller, thus linking schedule, promotional and ordering functions. If the user selects a particular Pay-Per-View event or service in this manner, the programming schedule system will next present to the user a Pay-Per-View ordering screen such as that shown in Fig. 23. The display includes a  
20 figure representing the cost of the event or service. The display also asks the user to choose from among a plurality of scheduled airing times 230A-230C, as well as whether the user would like to see a REMINDER message prior to the start of the Pay-Per-View event or service. The user responds to these inquiries by using the direction keys on the remote controller 40 to manipulate the cursor to the proper  
25 response and then depressing the ENTER key. After the user has ordered a Pay-Per-View event or service, the program schedule system will present the user with two ordering confirmation submenus, such as shown in Figs. 24 and 24A. In either of these submenus, the user can confirm or cancel the Pay-Per-View event or service.

- 30 If the user confirms the order, the microcontroller 16 stores the Pay-Per-View ordering information in a location in memory. The ordering information can then be transmitted to the cable operator by the microcontroller 16 either by phone line or on the cable line where the system has two-way communication or

other such interactive capability. Alternatively, a computer at the cable operator location can interrogate the memory where the microcontroller stored the Pay-Per-View ordering information. At the appropriate time, the cable operator supplies the Pay-Per-View event or service and it is received by all users who have ordered the  
5 program.

The second icon 151 in the Pay-Per-View bar of Fig. 15 identifies a specialized broadcast, cable or satellite programming service to which the user has access via the electronic program guide. In this mode, the electronic program guide application software acts to connect the user, through an appropriate data  
10 transmission link, to the programming service, at which point the user interacts with the service. Alternatively, the electronic program guide provides the navigation software, including the menus and scheduling information, for the particular programming service. Such a service could be, for example, Your Choice TV ("YCTV"), a service offering reruns of highly rated broadcast and cable programs,  
15 in which case the icon may take a form suitable to identify YCTV. The programming available on YCTV is then supplied to the user via the programming guide system.

The last icon 152 appearing in the Pay-Per-View bar of Fig. 15 identifies a display format which lists all Premium Services offered by the cable  
20 operator, as shown in Fig. 26. In this mode, the user can select for impulse ordering any one of the premium services by manipulating the cursor using the direction arrow keys on the remote controller and depressing the ENTER key. Similar to Pay-Per-View ordering, the system will present the user with a series of ordering displays and, if a service is ordered by the user, it will confirm the user's  
25 request using another other submenu. If confirmed, the microcontroller 16 will store the ordering information or transmit it directly to the cable operator. Once the order has been confirmed, the microcontroller can immediately allow the user access to the ordered premium service. In this manner, the user can order premium events or services on demand.

30 If, during FLIP or BROWSE modes, a user views a channel or schedule information for a service not subscribed to by the user, the microcontroller 16 causes an ordering submenu to appear instead of displaying a program signal along with the graphic overlay, as shown in Fig. 9. This submenu indicates to the

user that she does not currently subscribe to the selected service, and then asks the user if she would like to order the service. If the user responds affirmatively, the program schedule system takes the user to the ordering submenu discussed above. In this manner, the user can order premium events or services on impulse.

5           The third horizontal bar 63 in the MENU mode shown in Fig. 6 is the "Messages" or "Customer Service" listing. As shown in Fig. 16, the first envelope icon 160 represents message information available from the cable operator. When the user selects the message icon, he is presented with a screen display of currently available messages, as shown in Fig. 27. The display shown in Fig. 27  
10 includes cable system messages 270 and billing information 271. If the user selects the cable system messages option 270, she is presented with a message pertaining to the local cable operator, such as that shown in Fig. 28. If the user selects the billing status option 271 shown in Fig. 27, she is presented with a display of current billing information, such as that shown in Fig. 29. This information may include a  
15 history of purchases charged to the user, current balance information, pending orders, and, an indication of available credit, which can be an authorized debit limit previously arranged with the cable or other operator. Thus, a user could specify only a certain pre-set spending limit. Once the amount of charges from pay-per-view events reaches the limit, the microcontroller would not permit further ordering  
20 of events. An alternative messages menu is shown in Fig. 28A.

          The next icon 161 in the Customer Service information bar 63 of Fig. 16 identifies a "Viewer Preference" mode, which allows the user to create or revise a number of program schedule system operating parameters. Once selected, this display presents the user with several preference options concerning certain  
25 operating parameters of the program schedule system, as well as the viewing of certain channels and/or certain content-specific programming, for example, those shown in Fig. 7.

          The first option shown in Fig. 7 is the "Parental" option 70, which can also be expressed as a "Key Lock Access" option. Once this option is initially  
30 selected by the user, the system displays a "Key Lock Access" submenu such as that shown in Fig. 30.

          The Key Lock Access menu shown in Fig. 30 allows the user to control access to individual channels and programs or events by requiring the user

to enter an access code "key," consisting of a user-specified four digit code in the specific embodiment discussed herein, before ordering or viewing these pre-selected channels, programs or events. The menu display shown in Fig. 30 shows a series of subject categories that are entries in the vertical y-axis selectable by the user. A particular subject category is chosen by using the up or down direction arrow keys on the remote controller 40 to highlight the desired entry. Once the user selects a particular subject category, the left and right arrow keys are used to navigate within the chosen category.

The first subject entry shown in Fig. 30 is the "Parental Guidance" category 301. Once the user selects this category by manipulating the cursor to highlight the entry, the cursor can be then moved horizontally to an active window 302 which displays and selects one of the five letter rating items in the category. The letter items represent ratings of program content as follows: "V" for violence, "N" for nudity, "L" for language, "AS" for adult situations and "PD" for parental discretion. Once the user selects a particular item, such as "L", by moving to the active window 302 using the right direction arrow key, depressing the ENTER key will indicate to the microcontroller 16 that a key lock access has been selected for programs rated with a "L" rating for violent or explicit language. The system indicates activation of a key lock access by displaying a key icon directly below the "L" category display. Once a key lock access is set, it can be deactivated by selecting the category letter and then depressing the ENTER key. This action causes the key icon to disappear. The user can change the rating category in the active window 302 by using the left or right direction arrow keys on the remote controller 40, images of which are displayed on the screen adjacent the active window as a reminder to the user. In this manner, the user can select other rating categories for setting a key lock access for any of the program content identifiers appearing in the Parental Guidance category.

The key lock access code itself consists of a four digit code, which the user can enter and modify at any time. To do so, the user highlights the fourth vertically selectable entry "Change Key Lock Access Code," 304 by manipulating the cursor to highlight it using the direction arrow keys on the remote controller. Once highlighted, the user enters a new four digit code or revises the then existing code and depresses the ENTER key. The microcontroller 16 then identifies the ne

four digit key lock access code and stores it in memory. The user can clear the key lock access code, as well as all other previously activated keys, by moving to the last entry in Fig. 30, "Clear Key Lock Access Code and All Keys," 305 which highlights the "OK" window, and then depressing the ENTER key. This action  
5 clears and deactivates all previously set keys, as well as the key lock access code.

The schedule information database record for each program contains a field that corresponds to the program content identifiers in the Parental Guidance category. During operation, the microcontroller checks this field in response to a user command to tune to or order a program, or to display its corresponding  
10 schedule information before carrying out the tuning, ordering or displaying function. If the parental guide identifier in the program schedule information database record matches any one of the activated parental guidance identifiers shown in Fig. 30, the user will be prompted to enter the four digit key lock access code before the system takes any further action. If the entered code matches the key lock access code  
15 previously entered and stored by the user as described above, the system will carry out the user request to tune to the program, to order it, or to display its corresponding schedule information. If the code is not recognized by the system, no further action will be taken and the user's request will be denied.

By manipulating the cursor using the direction arrow keys to highlight  
20 the second entry, "MPAA ratings," 308 the user can also set a key lock access for programs based on their MPAA rating code, as also shown in Fig. 30.

As with the Parental Guidance category, once the MPAA rating category has been selected, the user can move horizontally within the category to the active window 306 to select one the five rating codes, i.e., "G" for general  
25 audiences, "PG" for parental guidance, "PG-13" for suggested parental guidance, no one under 13 admitted without an adult, "R" for restricted and "X" for x-rated. As with the Parental Guidance category, by selecting a particular rating --by using the left or right direction arrow keys until the particular rating code appears in the active window--and then depressing the ENTER key, the user sets a key lock access  
30 for the rating, in which case a key icon appears below the rating code. And, as with the Parental Guidance category, once a key lock access is set, the system will prompt the user to enter the four digit key lock access code anytime a request is made to tune to, order or display schedule information for a particular program

having a rating code which matches a rating code for which key lock access has been activated.

The Key Lock Access mode also includes a subject category 303 for controlling access to channels, which may be entitled, for example, "Channel Block" or "Channel Lock." As with the Parental Guidance 301 and MPAA 308 categories, the user navigates to the Channel Block category 303 by manipulating the cursor using the direction arrow keys on the remote controller and depressing the ENTER key. Once the Channel Block category 303 has been entered, the user can move horizontally to an active window 307, which in Fig. 30 indicates channel 2. Once the user highlights this window by manipulating the cursor using the direction arrow keys on the remote controller 40, a key lock access can be set for the channel appearing in the active window. This is done, as with the other subject categories in the Key Lock Access mode, by depressing the ENTER key, which again causes a key icon to appear below the channel number in the active window. The user can move to the prior channel or to the next channel in sequence by depressing either the left or right direction arrow key on the remote controller 40. In this manner, the user can activate a key lock access for any available channel.

As with the Parental Guidance 301 and MPAA 308 categories, once a key lock access is set for a particular channel, the system will prompt the user to input the key lock access code prior to carrying out an instruction to tune to or order that channel. If the input key lock access code matches the previously stored access code, the user's instruction is carried out. Otherwise, the user's instruction is ignored. Thus, the user can control access to the audio and video program content of any available channel. In this instance, the microcontroller 16 will not allow audio or video program signals to pass to the VDG, but it will allow schedule information to appear for the channel.

An alternative method for effecting lockout of programs is accomplished using a "Lockout" screen, as shown in Fig. 39. In addition to limiting access to programs based on the Parental Guidance, MPAA and channel criteria, as discussed above, access may be limited on the basis of program title. Fig. 39 shows an alternative Lockout screen 250 that can be used to permit or limit access to programs based on program title, in addition to the aforementioned



criteria. Other parameters also may be included, such as time of day, day of week, credit limit, and content category (e.g., talk shows).

To enter the Lockout screen 250 shown in Fig. 39, the user must enter a multi-digit lockout code using the numeric digit keys 42 and the enter key 44 on the remote controller 40. The lockout code is set initially when the system is first used or installed. To set a lockout code in the first instance, the user accesses a Setup screen 260, such as that shown in Fig. 40. The Setup screen 260 will automatically appear the first time the electronic program guide is installed and initialized. For access during normal operation of the electronic program guide, a suitable access path to the Setup screen 260 may be provided, such as from an appropriate icon in the MAIN MENU 215.

In the Setup screen 260 of Fig. 40, the user can navigate to the Lockout Code category 265 and set a new lockout code using the appropriate navigation and selection keys on the remote controller 40. A suitable menu for inputting the lockout code is shown in Fig. 40A. Once enabled, the lockout code must be used to set or modify locks, to view a previously locked program, or to clear or change the lockout code. The memory location of the stored lockout code also should be remotely accessible, such as by the local cable company, in case the user forgets the lockout code and it must be erased.

Once the lockout code is entered and the Lockout screen 250 of Fig. 39 is displayed, navigation within the screen is controlled by the direction keys 43A and 43B on the remote controller 40. Using the up and down direction keys 43A to move the selection cursor, either the Movie Rating 251, Parental Guidance 252, Channel 253, Locked Program 254 or Lockout Code 255 category can be selected. The left and right direction keys 43B are then used to navigate inside the selected category.

Clearing a previously set lockout code is accomplished by moving the selection cursor to the "Clear" entry 256 in the Lockout Code category 255 and depressing the enter key 44 on the remote controller 40. This causes the microcontroller to clear the lockout code stored in memory, as well as all locks previously set by the user. To change the current lockout code, the user navigates to the "Change" entry 257 in the Lockout Code category 255 and depresses the

enter key 44 on the remote controller 40. The user is then prompted to enter a new lockout code, which is subsequently stored in memory by the microcontroller.

To set a lock in either the Movie Rating 251 or Parental Guidance 252 category, the user navigates to the selected entry in Fig. 39 by manipulating the selection cursor using the direction keys 43A and 43B on the remote controller 40, and then depresses a lockout key on the remote controller, such as the padlock key 45A shown in Fig. 4. The microcontroller will appropriately modify the display to indicate that a lock has been set, for example, by changing the color of the text or the background in the selected entry window, or by displaying an appropriate icon next to the text in the selected entry window. In Fig. 39, a padlock icon 258 appears in the window of the "PG" entry in the Movie Rating category 251. Toggling the lockout key while the selection cursor is positioned on a selected entry will alternately enable and disable the lockout function for that entry.

Similarly, to set a lock for a particular channel, the user selects the channel using the selection cursor and then depresses the lockout key. In Fig. 39, the channel "4 KCNC" entry in the Channel category 253 has been locked, which is indicated by the inverse video and padlock icon appearing in the window.

Program locks also may be set by title, which can be effected in several ways. For example, when the above-described FLIP or BROWSE mode of the electronic program guide is enabled, thereby causing the title of a program to be displayed along with other program schedule information in a window superimposed on the actual program signal then being received, the user can limit access to the program corresponding to the displayed program information by depressing the lockout key 45A on the remote controller 40. The user also may limit access to the currently tuned program by depressing the lockout key 45A on the remote controller 40 while viewing the program, regardless whether the FLIP or BROWSE modes are enabled. In this instance, the microcontroller first removes the program signal from the display and then accesses the schedule information database record for the program then appearing and sets an appropriate flag to indicate the program has been locked. Also, when viewing program schedule information in the grid or category listings, as discussed above and shown, for example, in Figs. 18-20, the user also can tag a program for lockout by highlighting it with the selection cursor and then depressing the lockout key 45A on the remote controller 40.

In each of these instances, the microcontroller then stores the program title in a lockout title list stored in memory along with any other titles that previously have been locked out by the user. Individual items in the lockout title list are displayed in alphabetical order in the "Locked Program" window 259 shown in Fig. 39, and the user may scroll through the list by positioning the selection cursor on the Locked Program window 259 using the up and down direction keys 43A on the remote controller in Fig. 40 and then using the left and right direction keys 43B to scroll through the list one item at a time. In order to save memory space, alternatively, the microcontroller may be programmed to set a flag or otherwise mark the particular database record containing the program schedule information for the program that is to be locked out, and to thereafter access the database to retrieve the title information when it is to be displayed, such as when the viewer is reviewing the lockout title list in the Locked Program window 259.

Once an individual title has been locked out, the microcontroller can be programmed optionally to display an appropriate lockout icon, such as a padlock, whenever program schedule information for the locked program is to be displayed, such as in the window overlay of the FLIP or BROWSE mode, or in the various grid and category displays available in the MAIN MENU displays. The system also may display an appropriate text message if someone tries to access the program signal of a previously-locked program. Of course, once a program is locked, in all instances the microcontroller prevents access to the actual program signal (including both the audio and video portions of the program signal) until an appropriate code is entered or the lockout is removed.

Several methods can be used to block programs at their time of airing. For example, in the case of the Movie Rating, Parental Guidance and Channel categories, the schedule information database record for each program is provided with a field that corresponds to the rating, program content identifier or channel appearing, respectively, in the Movie Rating 251, Parental Guidance 256 and Channel 253 category of the Lockout screen 250 shown in Fig. 39.

During operation, the microcontroller checks the appropriate field in the database record in response to a user command to tune to or order a program before carrying out the tuning or ordering function. Additionally, the lockout code also may be used to restrict access to program schedule information. In this

instance, the microcontroller also would check the appropriate field in the schedule information database record before displaying schedule information for a program.

If the movie rating, parental guidance or channel identifier in the program schedule information database record matches any one of the locked-out entries indicated in the Lockout screen 250, a Lockout Verify screen 300 is displayed in overlaying relationship with the video signal then being displayed on the television receiver, as shown in Fig. 41. The user will be prompted to enter the previously set lockout code before the system takes any further action. As an added security measure, asterisks will be displayed as the user enters the lockout code. If the entered code matches the lockout code previously entered and stored by the user as described above, the system will carry out the user request to tune to or order the program, or to display its corresponding schedule information. If the code is not recognized by the system, no further action will be taken and the user's request will be denied. In this case, the Lockout Verify screen 300 will remain displayed on the television receiver waiting for a correct code to be entered. If no action is taken by the user, the Lockout Verify screen 300 will be removed after a predetermined time-out period, such as one or two minutes.

Similarly, in the case of lockout by title, the microcontroller also could check the title field in the schedule information database record and compare it with the list of program titles for which the user previously set a lock. If, as described above, the microcontroller does not maintain a list of the actual titles of programs locked by title, a suitable identifier can be set in a field in the database record to indicate that a program has been locked by title when the user first sets the lock, and, thereafter, the microcontroller could check that field in response to a user request to tune to or order a program, or display schedule information.

An alternative method for effecting lockout involves the use of a portion of the real-time program signal being received by the television receiver. With this method, codes corresponding to a program's rating, parental guidance category, title or channel are inserted into and transmitted along with the program signal, such as in the vertical or horizontal blanking intervals, or on raster scan lines that are not visible on the television receiver. When the program signal is received these codes are stripped from the program signal and stored in memory. Methods

and apparatus for the insertion transmission and reception of digital codes carried on a program signal are known in the art.

After the transmitted codes have been separated from the program signal and stored in memory, the microcontroller can compare them with the  
5 lockout criteria set by the user in the Lockout screen and take appropriate action, as described above.

The Setup screen 260 shown in Fig. 40 also contains a Purchase Code category 270, which allows the user to set a numeric purchase code that must be entered before any premium channels or pay-per-view programs can be ordered.  
10 The Setup screen 260 shown in Fig. 40 includes entries for setting a new purchase code and for clearing or changing a previously set password. Appropriate menus for setting, confirming, clearing or changing the purchase code are shown in Figs. 40B through 40E. Once a user sets a purchase code, the microcontroller thereafter will display a Purchase Code Verify screen in response to a user request to tune to  
15 or order a premium services channel or pay-per-view program. The Purchase Code Verify screen works in a manner similar to the Lockout Verify screen 300 in that the user is prompted to enter the previously set purchase code password before the microcontroller will tune to or order the requested program. If the correct purchase code is not entered, the microcontroller will take no further action and the Purchase  
20 Code Verify screen will remain displayed waiting for input of the correct code. If no action is taken within a predetermined time-out period, the Purchase Code Verify screen will be removed.

The next option shown in Fig. 7 is the Channel Preference or "Favorite Channel" list option 71. By highlighting this icon and depressing the  
25 ENTER key on the remote controller 40, the user is presented with a submenu on the screen such as that shown in Fig. 8.

In normal operation, the program guide system presents channels to the user in numerical order in response to an up or down change-channel command issued by the user using one of the direction arrow keys on the remote controller.  
30 The channel number presentation sequence includes all channels offered by the cable company in the order of which they are modulated onto the channel by the operator.

The program guide system also provides the capability of selecting from among several user-defined channel presentation sequences, which are

activated using one of the three "check mark" icon keys 48A, 48B or 48C on the remote controller 40 shown in Fig. 4. Each of these keys represents a preferred particular list of channels which a particular user selects and which the microcontroller stores in memory as a "Channel Preference" list, as discussed in detail below. To activate one of these preferred channel lists, the user depresses the corresponding check-mark icon key, in which case the microcontroller may display the chosen icon on the screen in the graphic overlays and full screen displays to remind the user that a particular channel preference list is being used by the system. Once a preference list is activated, the system will limit the tuning of the television receiver and the display of schedule information only to those channels that are designated in the activated viewer preference list.

To revise the content and/or sequential order of the channels in the Channel Preference list, the user enters the MENU mode of the programming guide system. To enter the MENU mode from the FLIP mode, the user twice depresses the MODE key 38 when using the remote controller 31 of Fig. 3. To enter the MENU mode when using the alternative embodiment of the remote controller 40 of Fig. 4, the user simply depresses the MENU icon key 47B.

When first entered, the MENU mode has a screen display such as shown in Fig. 6. To select the submenu for editing the Channel Preference list, the user first selects the third horizontal bar 63, which can be titled, for example, "Messages" or "Customer Service," by manipulating the cursor using the down direction arrow key, as shown in Fig. 7. The screen of Fig. 6A is thereby displayed. The user then selects the second icon 161 appearing in that bar, indicated with a check mark, which corresponds to a "Viewer Preference" mode, by highlighting the icon using the direction arrow keys and again depressing the ENTER key. This action will cause the microcontroller 16 to display a Viewer Preference submenu such as that shown in Fig. 7. By selecting the Channel Preference or "Favorite Channel" entry 71, the user enters the Channel Preference submenu, shown in Fig. 8. If the user has not already done so, he would then depress the particular check-mark icon key on the remote controller 40 of Fig. 4 to create or revise the particular channel preference list.

In the Channel Preference menu shown in Fig. 8, a list 80 of all channels available on the particular cable system is displayed on the left side of the

television receiver screen, labeled "Choices" in Fig. 8, and the viewer's preferred list 81, designated "Selected" in Fig. 8, is displayed on the right side. If a particular code, such as an END or "-1" symbol appears in the first (uppermost) position 82 of the viewer preference list 81, the system displays information for all channels in numerical order in all modes of operation. This is the default mode of the system.

By selecting channels in sequence from the available list 80 and placing them in the desired order in the preference list 81, the user can select a subset of channels and/or rearrange the default sequence in response to a channel up or channel down command from the user. This is accomplished by highlighting a channel in the available list 80 using the up and down direction arrow keys on the remote controller 40 and depressing the ENTER key 44, which stores the entry temporarily in a buffer.

The microcontroller 16 stores a list of all channels previously entered in the viewer preference list 81. As a particular channel is highlighted by the user when navigating through the available channel list 80 displayed on the left side of the television screen, a window 84 appears adjacent to the particular channel highlighted by the user. If the particular channel already appears in the viewer preference list 81, the system displays a "DELETE" message in the window 84 as a reminder that the channel was previously selected from the available channel list 80 and can only be deleted from the list 81, which is accomplished by depressing the ENTER key 44. If the particular highlighted channel in the list 80 was not previously selected, the system displays a "SELECT" message in the window 84 as a reminder that the particular channel will be selected for addition to the viewer preference list 81 if the user depresses the ENTER key 44. The microcontroller 16 inserts a selected channel at the bottom of the list 81. In this manner, the user can select or delete channels from the viewer preference list in any desired order.

The available channel list 80 may also be provided with categorical entries 83, such as movies, news, sports or children's shows. The user may also highlight any of these entries and put them into the viewer preference list 81. If the user does include a category in his viewer preference list 81, when the user issues channel up or down commands, the system will display, in sequence, first the user's selected preferred channels in numerical order and then all channels having a

program whose content corresponds to the selected category or categories at the time.

Once the user has revised the channel preference list 81 in the described manner, the microcontroller 16 will follow the stored user-specified channel sequence in response to a change-channel command made by the user  
5 employing one of the direction arrow keys. To activate the viewer preference list, the user depresses one of the three check-mark icon keys 48A, 48B or 48C on the top of the remote controller shown in Fig. 4. The viewer preference list can be used to selectively limit tuning of the television receiver or display of schedule  
10 information in any of the operating modes of the electronic program guide. In the present embodiment, once a preference list is activated, the system will limit the tuning of the television receiver and the display of schedule information in the FLIP, and BROWSE modes, as well as in the grid category and channel listings in the MENU mode, only to those channels designated in the activated viewer  
15 preference list. The tuner can not be tuned to, and no corresponding schedule information can be displayed for, any channel not entered in the viewer preference list when it is activated. In this regard, it should be noted that setting a key lock access in the Parental Guidance 301, MPAA 308 or Channel Block 303 categories produces a different result than when using other display criteria, such as the  
20 Channel Preference List of preferred channels discussed above. Thus, while a key lock access will prevent audio and video program information, but not schedule information, from being displayed or ordered absent entry of an authorization code, if a particular channel is included in the Channel Preference list and also has a key lock access activated in the Channel Block category 303 of the Key Lock Access  
25 mode, that channel or its corresponding schedule information will not be displayed at any time.

To deactivate a previously selected viewer preference list, the user toggles the appropriate check-mark icon key on the remote controller 40 of Fig. 4. Once deactivated, the system defaults to displaying and tuning all available  
30 channels, as well as displaying schedule information for all available channels.

Alternatively, the viewer preference list 81, if activated, can be used to control tuning and display of schedule information only in selected modes, such as only in the FLIP mode, thus allowing the user to tune and view corresponding



schedule information only for those channels entered in the preference list 81 in the FLIP mode, while viewing all channels and corresponding schedule information in all other modes.

In this latter configuration, as well as in the instance where no  
5 channel preference list is activated and the system is in default mode, if a channel appears in the viewer preference list 81 that corresponds to a service not subscribed to by the user, the microcontroller 16 causes an ordering submenu to appear instead of displaying a program signal along with the graphic overlay, as shown in Fig. 9. This submenu indicates to the user that he does not currently subscribe to the  
10 selected service, and then asks the user if he would like to order the service. If the user responds affirmatively, the program schedule system takes the user to another ordering submenu to confirm the user's request, as with impulse ordering.

The program guide also may be configured with a Locator screen  
201, as shown in Fig. 37, which aids the viewer in channel selection and definition  
15 of a favorite channel list. The Locator screen 201 displays all available channel numbers grouped according to the source of the program information appearing on any particular channel at any particular time, e.g., broadcast, cablecast, pay-per-view, near video on demand, satellite, or other source of program material. Thus, the Locator screen 101 can be used to locate any particular channel or service  
20 because the groupings provide a quick and efficient method for scrolling through the list of available channels. The channel numbers also may be grouped according to other criteria, such as program category, program content, program rating or other content-based standard, time of availability, numerical order, or other logical grouping.

25 In the example shown in Fig. 37, the user navigates within the Locator screen 201 using the direction keys 43A and 43B on the remote controller 40. The right and left direction keys 43B move the selection cursor within the category rows, while the up and down direction keys 43A are used to select a particular category. From the Locator screen 201, any particular channel can be  
30 selected for viewing by positioning the selection cursor on the desired channel and depressing either the enter key 44 or an optional tune key (not shown) on the remote controller 40.

In addition to aiding in channel selection, the Locator screen 201 also provides the user with the ability to conveniently define favorite channel lists. To do so, the user first moves the selection cursor to the desired channel by using the direction keys 43A and 43B or numeric digit keys 42 on the remote controller 40, and then depresses a favorite channel key 46A provided on the remote controller 40, which causes the display to change in some manner or characteristic as an indication that the channel has been selected as a favorite channel, such as by changing the color of the channel identification text or the text background, by displaying an appropriate icon or by some other appropriate identification scheme. In the remote controller 40 shown in Fig. 4, the pound key "#" can function as the favorite channel key.

Also, if multiple favorite channel lists are being used, the user would depress the appropriate favorite channel key on the remote controller to select a particular list before depressing the favorite channel key. For example, as discussed above, the remote controller 40 shown in Fig. 4, has three color-coded check-mark favorite channel keys 48A, 48B and 48C, which provide for at least three individual favorite channel lists for three individual users. Different identification characteristics could be displayed on the Locator screen 201 to indicate that a particular favorite channel list is selected. For example, the icon or image used to enable a favorite channel list on the remote controller, such as the check mark key 48A used on the remote controller 40 shown in Fig. 4, could be displayed on the Locator screen 201, as well as other screens of the program guide, when a favorite channel list is enabled. Alternatively, the color of the displayed text or background could be changed to match the color of the selected favorite channel key.

The Locator screen 201 may be accessed via several paths. For example, it may be included as a virtual channel that is conveniently positioned in the channel-tuning sequence, such as between the highest and lowest available channel numbers -- for example, a virtual channel 0. To the user, such a virtual channel appears to be a conventional channel. However, it requires no additional bandwidth as a carrier. For example, it can be digitally produced at the subscriber station or included in an appropriate blanking interval in existing bandwidth frequencies. In this manner, the virtual channel is accessible either by entering the corresponding channel number using the numeric digit keys 42 on the remote

controller, or by using the up and down direction keys 43A to wrap around from the highest to the lowest channel number, or vice versa. As shown in Fig. 38, it also may be desirable to provide a suitable identifier, such as an icon or text message 210, in the MAIN MENU display 215, from which the user could access the

5 Locator screen 201 simply by highlighting the identifier 210 with the selection cursor and depressing the enter key 44 on the remote controller 40. Alternatively, the remote controller may be provided with a key corresponding to the Locator screen 201 which would cause the microcontroller to display the Locator screen 201 when the user depressed it.

10 In addition to Channel Preference or Favorite Channel keys, the remote controller 40 can also be supplied with a number of user-activated category preference icon keys, e.g., movies, sports, or children's programming. The system can be adapted to present to the user only those programs meeting particular preference category when it is activated by the user. As with the Channel

15 Preference icons, the microcontroller may display the icon corresponding to the activated preference category to remind the user of the currently activated mode of system operation.

The question mark icon 162 at the far right of the third horizontal bar in the menu of Fig. 16 identifies a program guide system "Help" mode in which

20 information explaining the operation of the system is displayed for the user. Again, by manipulating the cursor using the appropriate keys on the remote controller, the user can select this mode. Once selected, the next submenu appearing in the Help mode asks the user to identify the particular portion of the system about which the user would like to view Help information.

25 The icons appearing in the last horizontal bar of the MENU mode identify certain interactive and/or other types of information services which the programming system, acting as a gateway, makes available to the user as shown in Fig. 17. By manipulating the cursor, the user can select any one of the identified services, as shown in Figs. 31-35.

30 For example, if the user initially selects the "X\*PRESS" icon appearing in the last horizontal bar, he is presented with a submenu such as that shown in Fig. 31. Using the direction arrow and enter keys on the remote controller, the user selects one of the three entries appearing in the display of Fig.

31. Once a particular entry is selected, the electronic program guide connects the user to the selected service and passes control to the particular service application software, as shown in Figs. 32-35.

Alternatively, the remote controller 40 can be supplied with a plurality of content-specific keys corresponding to a plurality of content-specific categories of programming, e.g., a Sports key, News key, Movie key, etc. When the user depresses a content-specific key, a content-specific mode is initiated. In Fig. 4, the remote controller is equipped with a Sports key 49. If the user depresses the Sports key 49, the microcontroller will limit the display of programs and/or program schedule information to those that are sports-related. The microcontroller will block all other programming or schedule information from appearing on the television receiver. The microcontroller can be adapted to distinguish programs and schedule information that are sports-related by examining an appropriate code associated with the program or schedule information.

As discussed above, coding can be accomplished using any number of methods, such as by including an appropriate code in the vertical blanking interval of the program signal, or in an appropriate memory location in the database record of the program schedule information, or if the schedule information is being received on a broadband network, by including it in an appropriate blanking interval. The user activates a content-specific mode by depressing the appropriate content-specific key in any mode of operation of the electronic programming guide, including the aforescribed FLIP, BROWSE or MAIN MENU modes, as well as when no schedule information is being displayed and only a program signal is visible on the television receiver. Once a content-specific mode is requested by the user, the microcontroller immediately and directly enables the content-specific programming criteria, and maintains it for all operating modes of the guide until disabled, which can be accomplished, for example, by toggling the Sports key 49.

Instead of a dedicated content-specific key, such as Sports key 49, the system may be configured with a single, generic content-specific key, which, when activated, would cause the microcontroller to display a content-specific menu containing a list of all content-specific categories available to the user. The user then could highlight a particular category by manipulating the selection cursor using the direction arrow keys on the remote controller and select it by depressing the

ENTER or OK key 44. As an alternative to using a content-specific key on the remote controller, access to the content-specific menu can be effected by providing an appropriate identifier in another menu screen of the electronic guide, such as in the LOCATOR, SETUP or MAIN MENU screens.

5                   In addition to blocking all non-selected content-specific programming when a particular content-specific category has been selected, the microcontroller can be programmed to enable all added-value programming or services that are specially related to the selected content-specific category. For example, if the user activates a Sports content-specific mode, the microcontroller, in addition to allowing  
10                   only sports programming or schedule information related to sports programming to be displayed, will proactively seek out and enable all sports related added-value services, such as related trivia or video games, up-to-date scores while a game is in progress, team schedules, replays of prior games of the selected teams or players, ticket or souvenir purchasing, etc. Thus, the information available from the  
15                   programming or service can be integrated into the environment of the electronic program guide. Rather than simply passing control to another service as described above, in this manner the electronic program guide would function as a system integrator or interface to combine the available added-value information into a package within the electronic guide environment, thus essentially creating a series of  
20                   modular electronic program applications corresponding to a variety of available content-specific categories.

                  The Setup screen shown in Fig. 40 also includes a Text Location category 275, which contains the textual entries "Bottom of Screen" and "Top of Screen." By navigating to the Text Location category 275 using the up and down  
25                   direction keys 43A on the remote controller 40, and to either the "Top" or "Bottom" entries in that category using the left and right direction keys 43B on the remote controller, and then depressing the enter or select key 44, the user can control the position of the overlay windows used to display information in various operating modes of the electronic program guide. The Setup screen of Fig. 40  
30                   provides the user with two positional choices: the top or bottom of the screen. Depending on the modes of operation of the program guide, it may be desirable to provide the user with more positional choices in viewing area of the television

receiver, or to provide the user with the ability to choose a different position for information displayed different operating modes.

The operation of the "By Title" display option will now be described. This option permits users to display program titles alphabetically by title. In addition,  
5 the user may input a string of characters representative of a program title or beginning portion thereof and search the program listings for the desired title. This permits a user to locate a program, series, movie, or event without knowing either the channel or time for the program.

One embodiment of the "By Title" option operates as follows. When the  
10 user selects the "By Title" box 321 shown in Fig. 38C, she is presented with the screen shown in Fig. 38D.

As shown in Fig. 38D, the system is configured to automatically display the listings in alphabetical order. It is preferable that upon entering the "By Title" option, the first displayed set of listings correspond to the beginning of the alphabet.  
15 However, it may also be configured such that if the user previously invoked the "By Title" option and then exited it, the listings will begin at the point where the user last reviewed listings using this option. The display line 325 for each listing preferably includes the program, movie, or series title, network, channel, day (today or tomorrow), and time. For some programs, such as movies and sporting events,  
20 additional descriptive information may be included. In addition, display lines may include the "i" icon to indicate that additional information about the program is available and/or other icons conveying other kinds of information or advisories. Color coding may be used to distinguish different program types. For example, movies may all be displayed in one background color while sports programs utilize  
25 a different color.

In systems having a large database of program schedule information, e.g., one with a large number of channels and/or listings for many days of programming, it may be desirable to utilize only a subset of the total listings database for display in the "By Title" mode to reduce the time required to search the listings. For  
30 example, in the particular embodiment shown in Fig. 38D, only programs scheduled for the present day or the following day are displayed. Additionally, it may be desirable to exclude uninformative listings identified only by generic titles such as "News," "Infomercial," "Music Video," and "To Be Announced."

The "By Title" option operates in two different modes, search and scroll. In the scroll mode of operation shown in Fig. 38E, the user may manually scroll through the alphabetical list of program titles using the up/down arrow keys 43A on the remote control unit 40. In Fig. 38E, the program "Mad About You" is highlighted indicating the cursor is placed on this program listing. The character boxes 330 in Fig. 38E do not control the listings display in this mode, as the display is controlled with the up/down keys. The "r" icon 335 in the display line indicates that a reminder message has been set for this program as discussed above. The envelope icon in the upper right hand corner of the display indicates to the user that there are messages in the message center. These messages may originate from and relate to the cable system, as discussed above. The scroll mode is accessed by depressing the ENTER or "OK" key 44 on the remote control upon initiation of the "By Title" option or at any later point when the search mode is activated.

The second mode of operation of the "By Title" option is search mode. In the preferred embodiment, search mode is the default mode activated upon selection of the "By Title" option. Search mode may also be accessed by depressing either the left or right arrow keys when in scroll mode. In search mode, the user may input one, two, three, or four characters of a program title using the character boxes 330 shown in Fig. 38F. Characters are input using the up/down arrow keys 43A and the ENTER or "OK" key 44. By depressing the up/down keys, the characters in the character boxes cycle through the letters of the alphabet and the digits 0-9. The arrows displayed around the perimeter of a character box designate the box currently activated and the keys which may be depressed. Once the desired character is selected, depressing the right arrow key moves the cursor to the second character box and so forth.

In the embodiment disclosed in Fig. 38F, when the cursor is moved to an adjacent character box, the system automatically searches the listings and displays the appropriate listings, with the listing closest to the entered character or characters highlighted. Alternatively, the system may be configured to search in real time as characters are changed in the character boxes. In Fig. 38F, the characters "M," "A," and "D" have been selected in the boxes in order to search for the program "Mad About You." In the listings portion of the screen, the display line listing "Mad About You" is displayed in the first line, indicating that this program is the

closest match to the characters entered. The user may also input numbers in the character boxes so that programs with numbers in the beginning of the title may be searched (i.e., the movie "2001"). To return to scroll mode the "OK" or "ENTER" key 44 is depressed.

5           Those of skill in the art will recognize that there are many possible variation to the embodiment of the "By Title" option depicted in Figs. 38C-38F. For example, the user may be given control over the particular subset of listings to display. Thus, the listings may be limited to today's programs or expanded to a full week of programs. In addition, a greater or lesser number of character boxes may  
10 be used. Additionally, the program listings may be limited to channels previously selected in a Favorite Channel list. Alternatively, the "By Title" option may be combined with one of the other operating modes of the system. For example, the system may be readily configured to limit the "By Title" listings display to a single channel, time or theme.

15           One of the novel features of the disclosed invention is the textfit system. The preferred embodiment of the text fit system includes an interactive computer program used to edit the program listings data before it is transmitted to the user and stored in memory. The interactive system operates as follows: unedited (or partially edited) program listings information is loaded into data a  
20 processor. The data includes program titles, program schedule times, duration, category, as well as additional descriptive information dependent on the type of program. For example, for movies the data includes the MPAA rating, year of the movie, whether it is in black and white, and a list of starring actors and actresses.

          The data processor extracts only the program title data which include  
25 television program titles as well as movie titles, sporting events and titles for other special events. Based on the duration of the program, the data processor first analyzes the listings data to determine what grid size listings are needed for each title. Thus, a two hour movie could require four different edited titles to fit into each of the four different size grid cells (30, 60, 90, 120 minutes). The data  
30 processor then determines how much space is required to display the title based on its character length. If the title is to be displayed in the program schedule grid using a proportional font and character to character kerning, the data processor may also account for these factors in determining the space required to display a title.



The determination would then be based on the number of pixels required for the particular combination of characters in the title. The amount of space available for display of a title depends on the size of the grid cell and the space required for display of icons, when activated.

5                   If the data processor determines that a full title requires too much space to fit into one or more grid cells, the title is then presented to the editor using a suitable display device connected to the data processor, such as a CRT. The editor is then queried to alter the title so that it will fit in the allotted space. If the title must be edited for more than one cell size, the editor is queried to edit each of  
10 these separately. In the preferred embodiment of the interactive program, the editor is shown in real time whether the edited title will fit in the designated grid cell.

                  In the preferred embodiment, two lines of text are displayed in each grid cell of the program listings. The title, as edited, appears on the first line, and if necessary, continues onto the second line. The decision to wrap-around to the  
15 second line is based on whether natural breaks exist in the title such as spaces between words, commas, periods, hyphens, etc. These are standard techniques used in word processing software routines. The editor may also be queried to edit a title in the situation where the full title will fit on the allotted two lines, but a hyphen is required because there are no natural breaks in the title.

20                   Prior to querying the editor to shorten a title, the data processor compares the title with a stored library of shortened titles to determine if the title had previously been shortened while editing another listings database. Each time changes are made by the editor to a title, the shortened title is added to the library. It is apparent that this process of building a library of shortened titles greatly  
25 reduces the manual input required.

                  A flow chart illustrating the process by which the text fit system operates is shown in Fig. 42. The chart illustrates the operation of editing a listing for display in a program grid for a single platform, but operation is the same for all platforms.

30                   Text editing may be necessary in other situations besides that where multiple size grid cells are used for display of the same title. For example, the disclosed program guide may run on several different platforms, with each one having different constraints and grid cell space availability. Some may not display

the text in proportional fonts and some may have other limitations reducing the available space. Thus, in the preferred embodiment the interactive program would request edits for all platforms for which they required at the same time. In addition, editing of text may be required for display modes other than a grid of program listings. For example, in the "Listings by Channel" display of fig. 20, programs are listed on an entire, fixed-length line, but the length of the line may vary from platform to platform, so that the text fit system may be employed for the purpose of editing listings for the different platforms in this display mode as well. The space available for the display of text will also depend on how much space is reserved for icon display. The same process as that shown in fig. 42 would apply, except that there would be no need to determine what grid sizes are needed because a fixed length line is used for display rather than multiple sized grid cells.

It will be apparent to those of skill in the art that the disclosed text fit system has applications beyond that of title editing alone. The system may be easily modified to provide editing of messages, "i" screen storylines, pay-per-view promotional copy, and similar text messages so that they will fit into the designated space available for display of the text. In fact, the system may be used to edit any text for display in the disclosed program schedule system.

The computer program for the microcontroller 16 may also include a schedule for the display of varying background views upon which the program schedule information is overlaid either partially or in a full screen display. The background views may be stored as bit maps in memory or in another storage medium, such as an optical storage device. For example, the microcontroller 16 may be programmed to issue a command to the VDG every morning at 6:00 AM to display a sunrise in the background. The background may then be changed accordingly throughout the day to, for example, a blue sky or a nighttime view. It also may vary, e.g., by time of day, day of week, month, year or season. The mood background also could change depending on the particular category of programming that the user is watching or to which selected schedule information pertains. The mood background also may be adapted to display scenes that reflect the particular viewing area in which the user is situated, like the Rocky Mountains, or Mt. Rainier, etc. It also may be possible to display standard scenes, such as an ocean or forest scene. Moreover, the audio background also could be adjusted to

relate to the particular mood background then being displayed. In addition, different background views may be used for holidays and special events, such as Christmas, Fourth of July, Superbowl Sunday, etc. The purpose of the background views is to help ease the monotony of viewing program listings. The

5 microcontroller 16 could be adapted automatically to coordinate the display of the mood background. The user also could be given the ability to choose from among various mood background displays by adapting the microcontroller to display an appropriate mood option menu that lists the mood background options available to the user and allows the user to select one or more by manipulating the selection

10 cursor. Access to such a mood option menu could be achieved by supplying an appropriate identifier, textual or visual, in an appropriate menu of the system, such as the LOCATOR or SETUP screen.

Additionally, the electronic program guide could be configured to store a unique digital identifier for each program along with its schedule information

15 and later use the identifier -- e.g., by transmitting it -- to indicate to a recording or storage device, such as a video recorder, that the user wishes to record the program. The program guide could also use the identifier to automatically control operation of the video recorder. The electronic program guide could also be configured to use other stored schedule information for this purpose.

20 The form and content of a particular computer program to implement the invention disclosed herein will be readily apparent to those skilled in the art of video system programming and graphic display. A flow chart showing the operation logic of the system is shown in Fig. 36. It will also be appreciated by those skilled in the art that there can be departure from the specific embodiment of

25 the invention described herein without departing from the true scope of the claims appended hereto.

We claim:

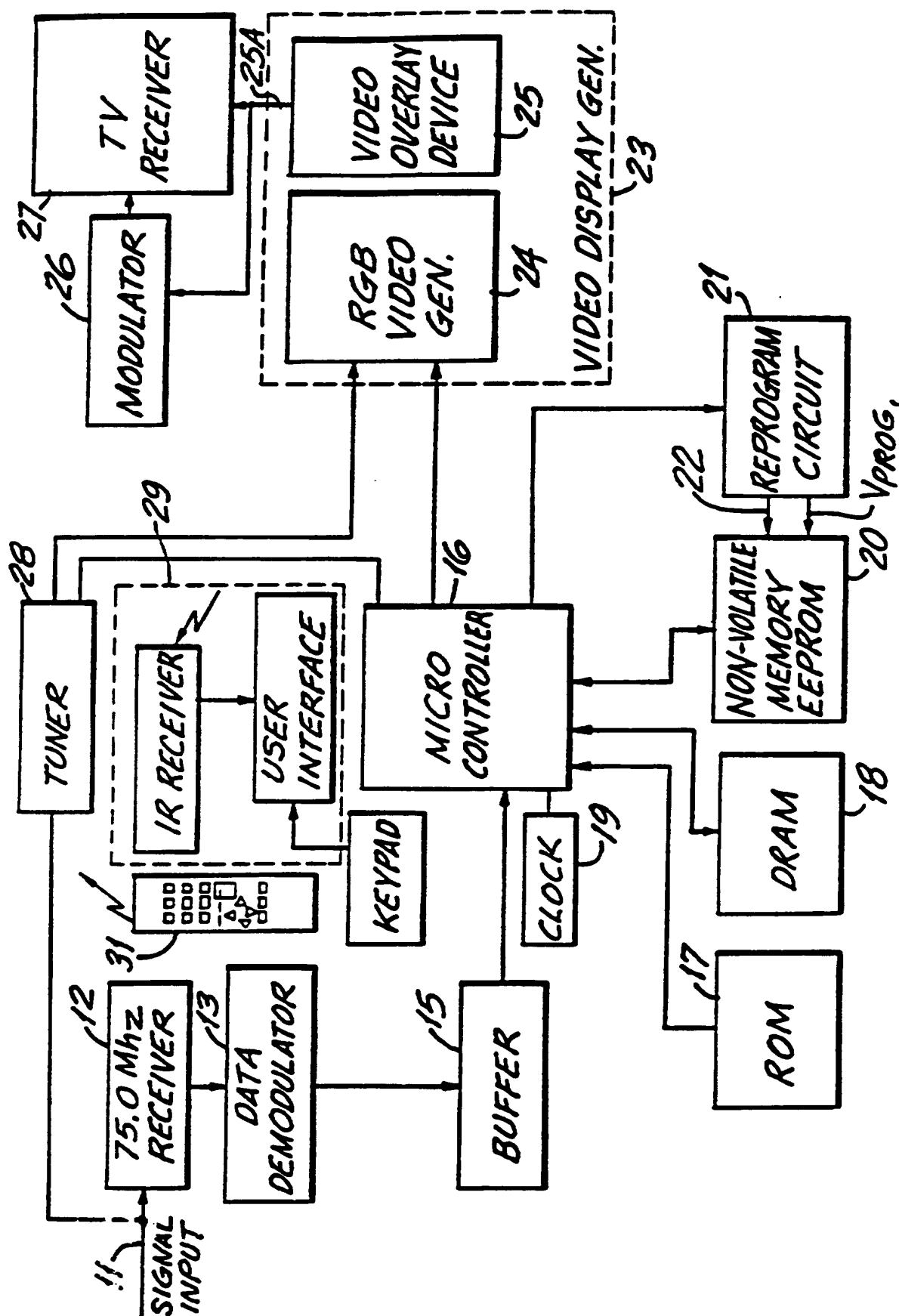
1. An electronic television programming guide for use in connection with a television receiver for displaying a plurality of television programs from a plurality of program sources on a plurality of user-selectable television channels comprising:

user control means for issuing control commands, including channel-control commands;

- data processing means for receiving said control commands and for generating video control commands;

- a video display generator adapted to receive video control commands from said data processing means for generating and displaying a plurality of television program titles on said television receiver, said plurality of television programs displayed alphabetically by title; and

- selection means for allowing said user to select a title for display on said television receiver by selecting the first n characters of said title, where n is greater than or equal to one; said data processing means being responsive to said selection means and adapted to select said plurality of television program titles for display on said television receiver in response to said n characters.



I  
G  
F

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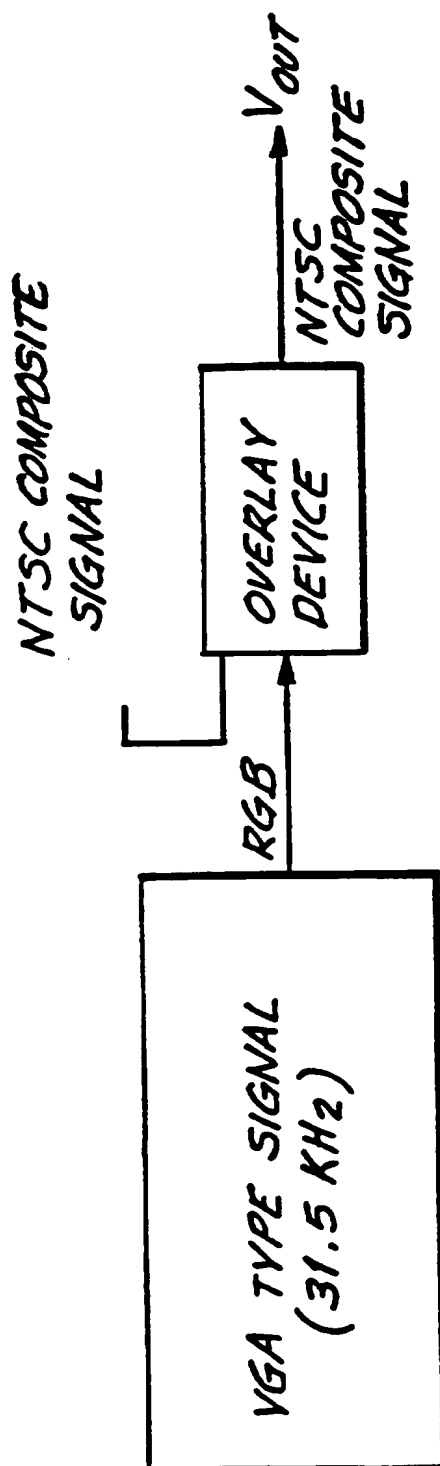


FIG. 2

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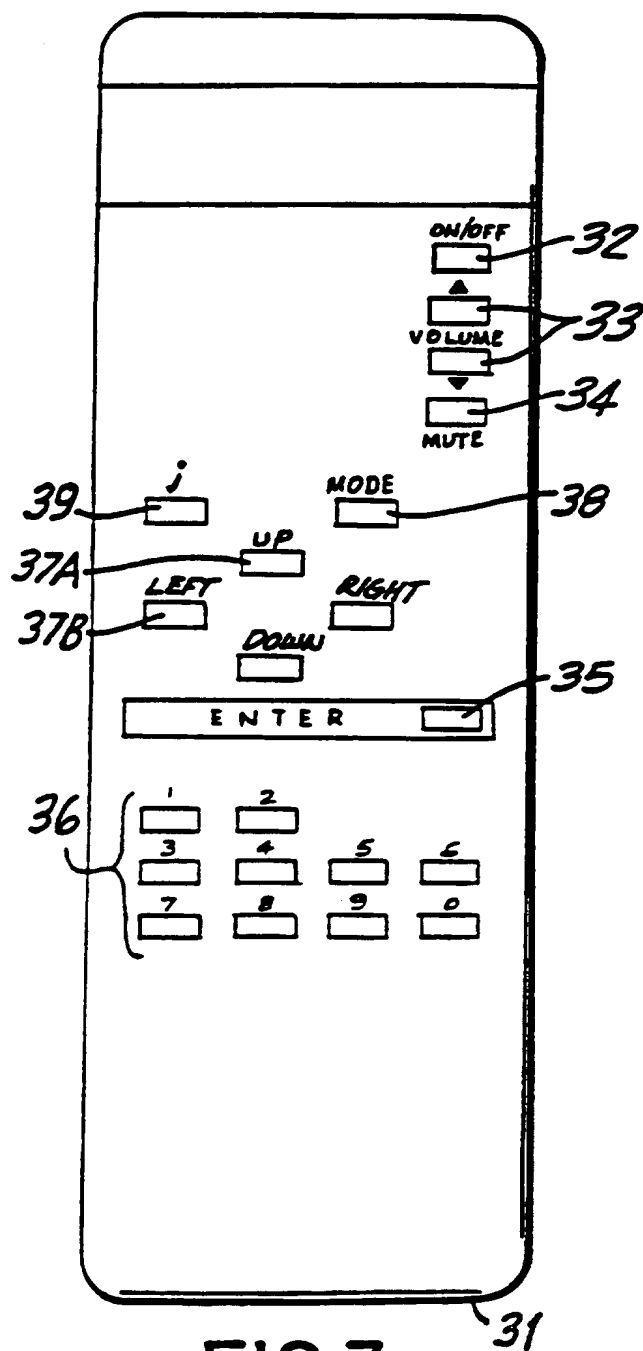


FIG. 3

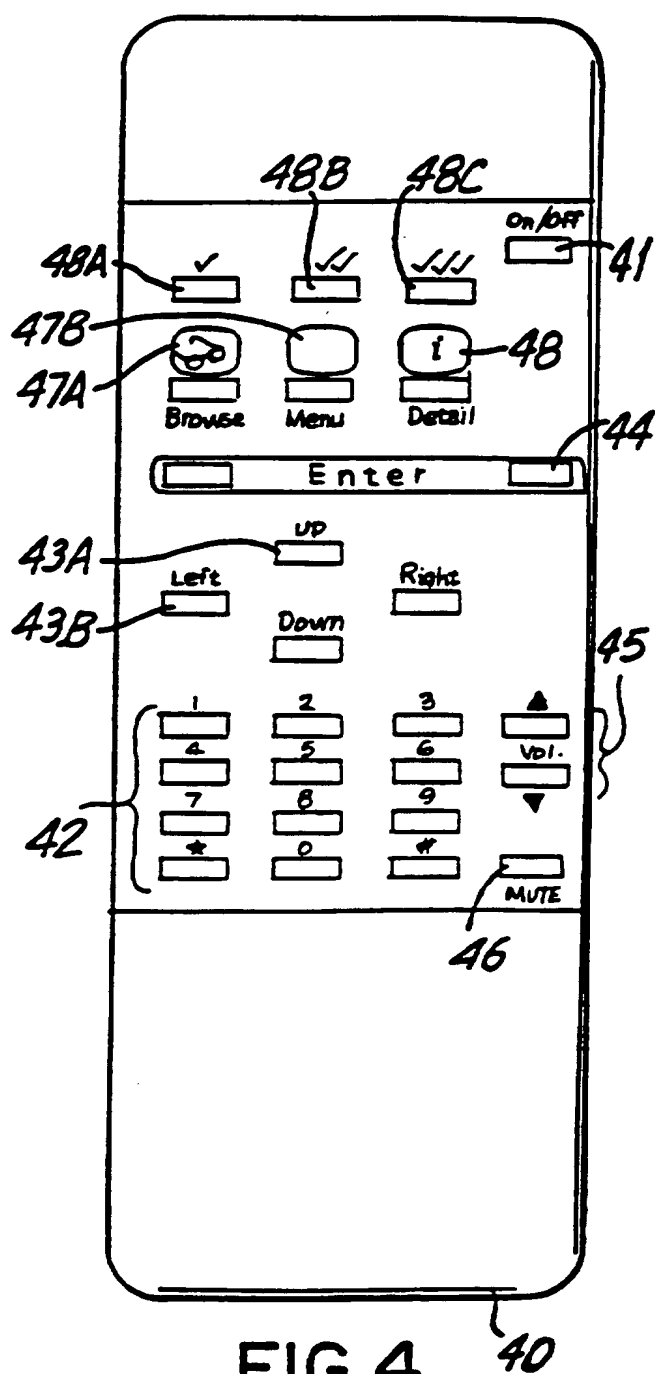


FIG. 4

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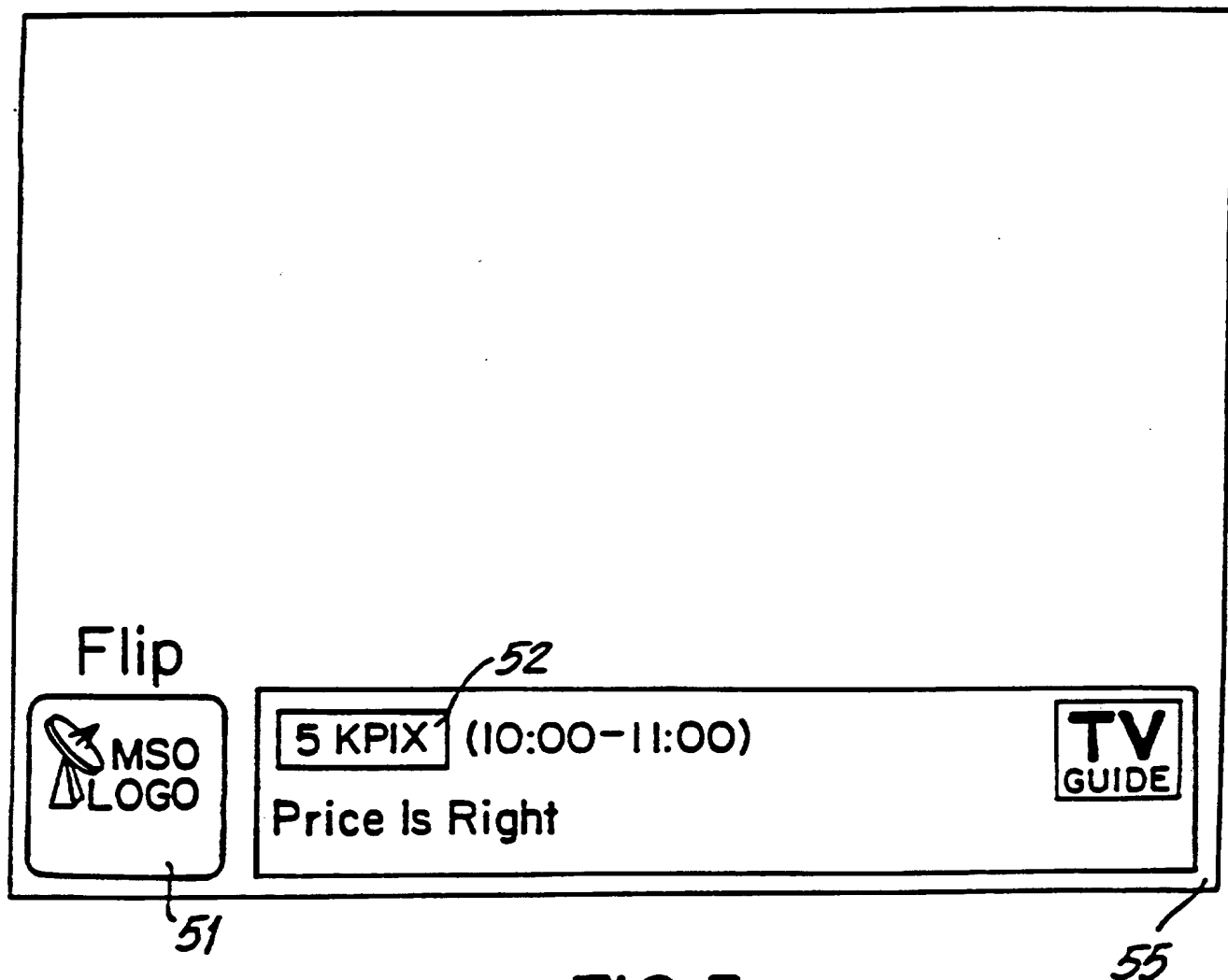


FIG.5



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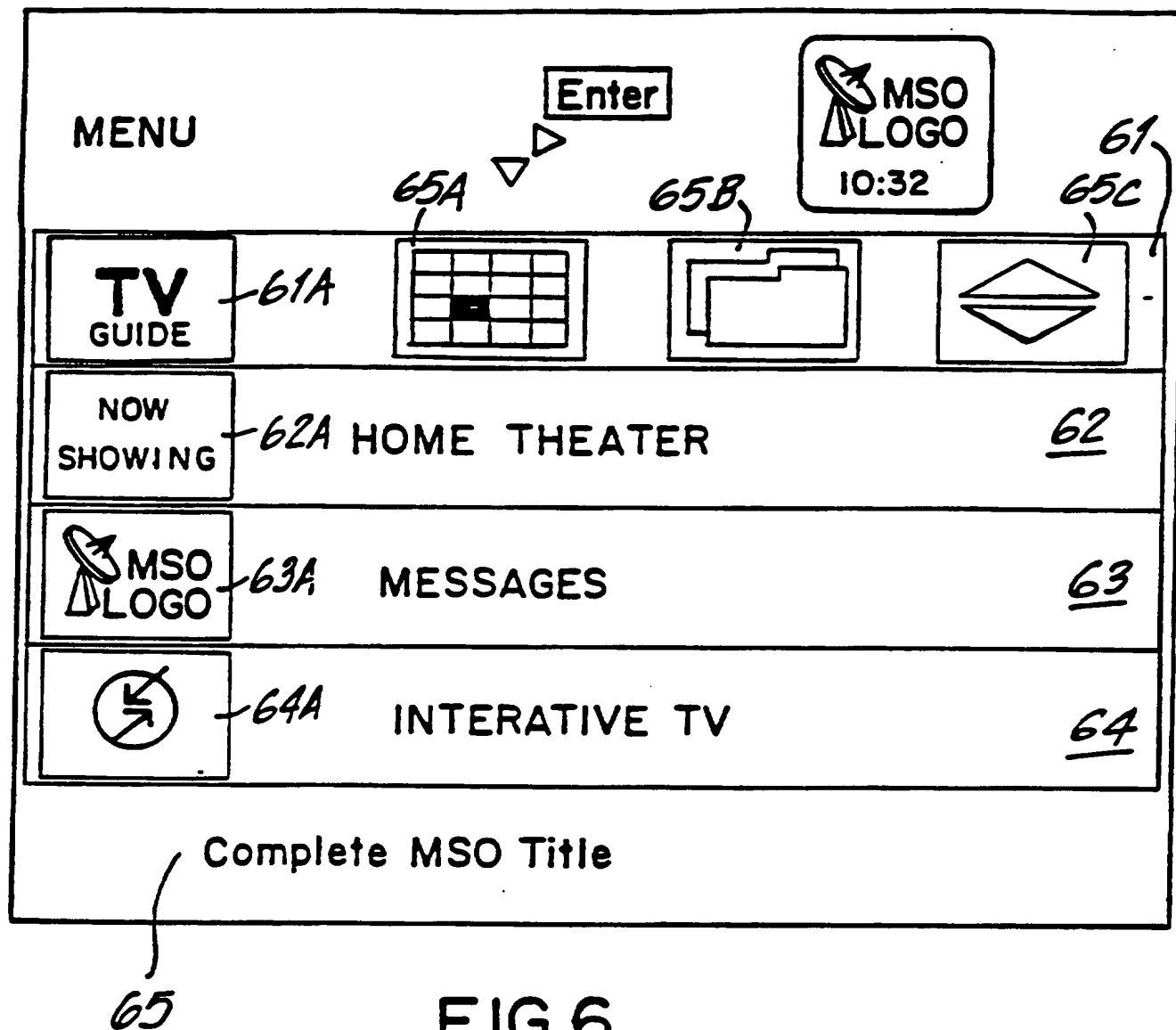


FIG.6

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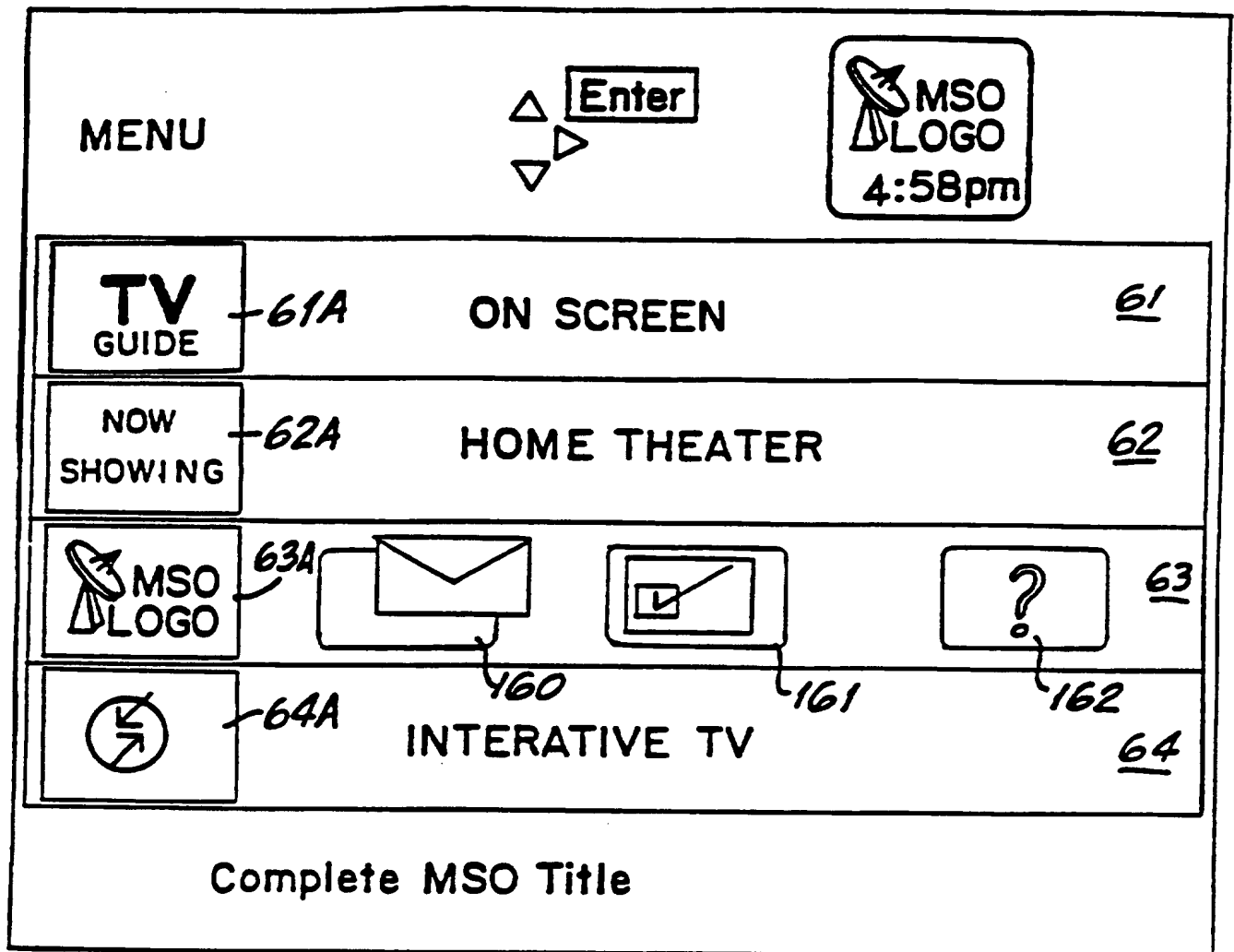


FIG. 6A

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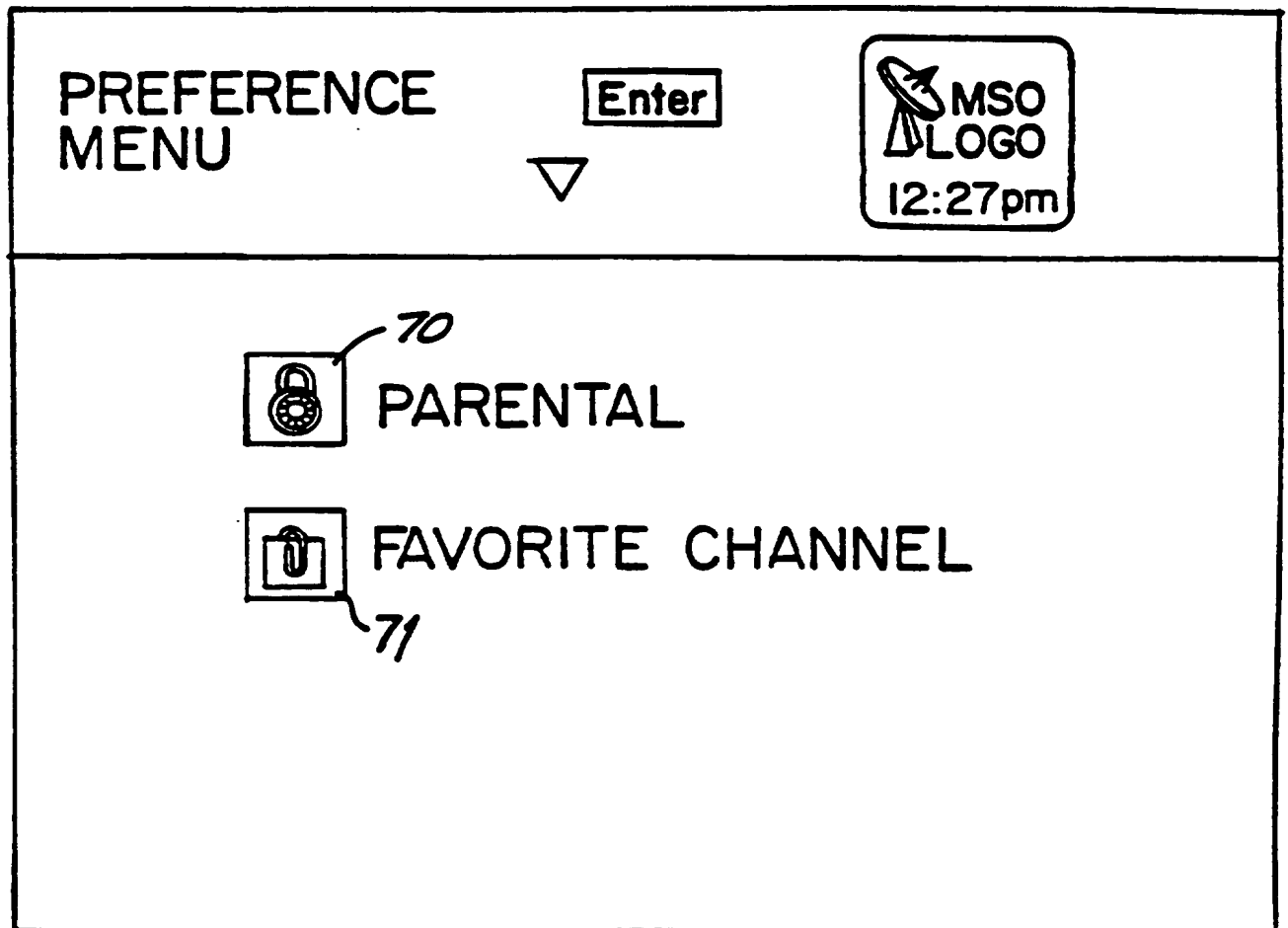


FIG.7

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FAVORITE CHANNEL		<div>Enter</div>		<div>TV GUIDE 12:25pm</div>	
Choices		Selected			
4 KCNC		82 15 REQ2			
5 SHO	Delete				
6 KRMA		84 81 29 KUSA			
7 KMGH		7 KMGH			
8 MUN1		5 SHO			
9 KUSA	← 80	3 PPV			
10 KTCI		<div>MOVIES</div>			
11 REQ1					
<div>MOVIES</div>					
<div>NEWS</div>					
<div>SPORTS</div>	83				

FIG.8

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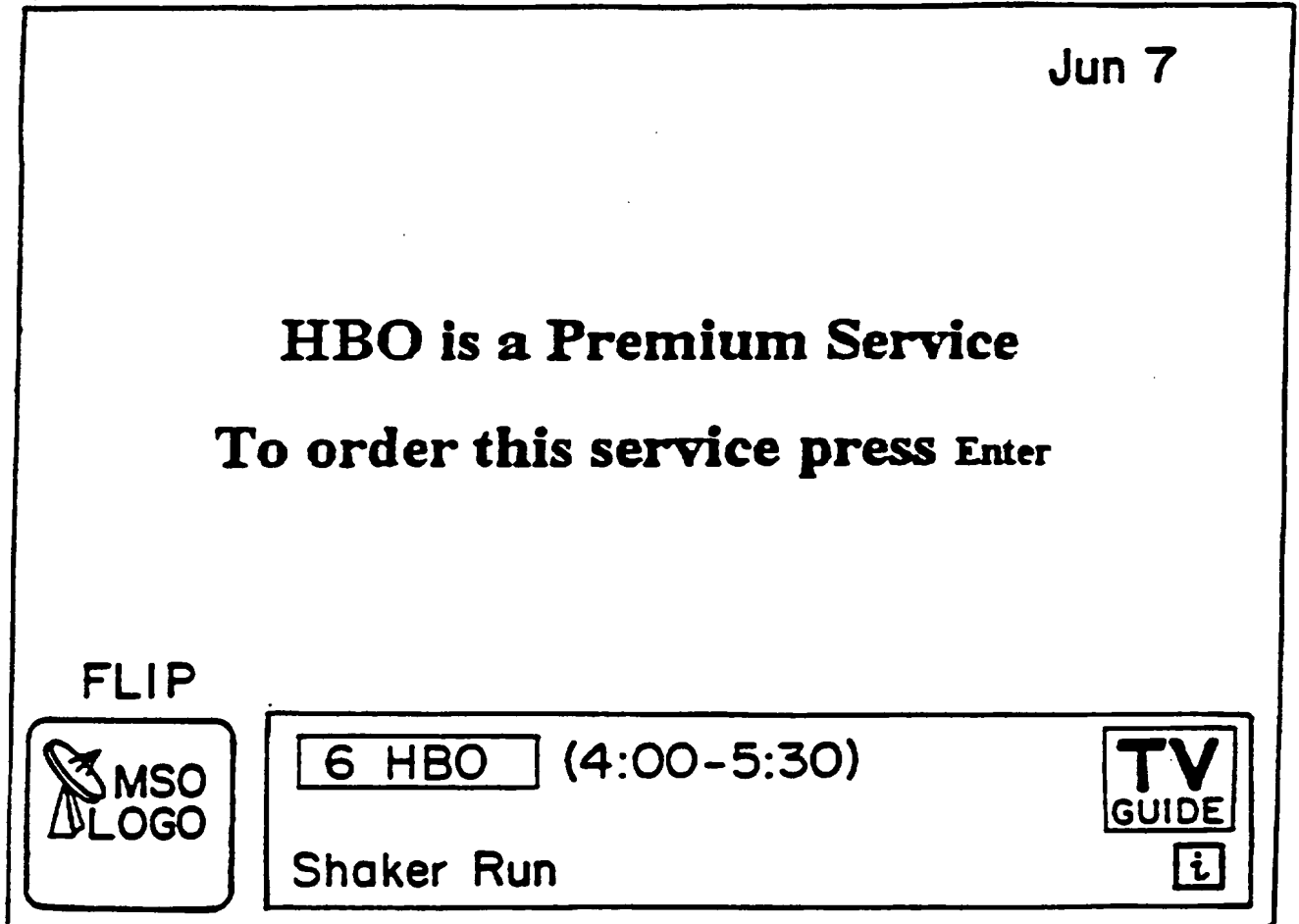


FIG.9

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Premium Services	<input type="button" value="Enter"/> ▽	 5:03pm
<input type="button" value="HBO"/>	Home Box Office \$10.40/Month	
<input type="button" value="SHO"/>	Showtime \$9.95/Month	
<input type="button" value="DIS"/>	The Disney Channel \$9.95/Month	
<input type="button" value="TMC"/>	The Movie Channel \$1.50/Month	
<input type="button" value="MAX"/>	Cinemax \$9.95/Month	
<input type="button" value="PLA"/>	Playboy at Night \$4.95/Evening(5:00pm to 3:00am)	
<input type="button" value="ACT"/>	Action \$5.95/Day(11:00pm to 3:00pm)	
Movie, special events, and family programming!		
You are not a Subscriber. Press <input type="button" value="Enter"/> to Subscribe!		

FIG. 10

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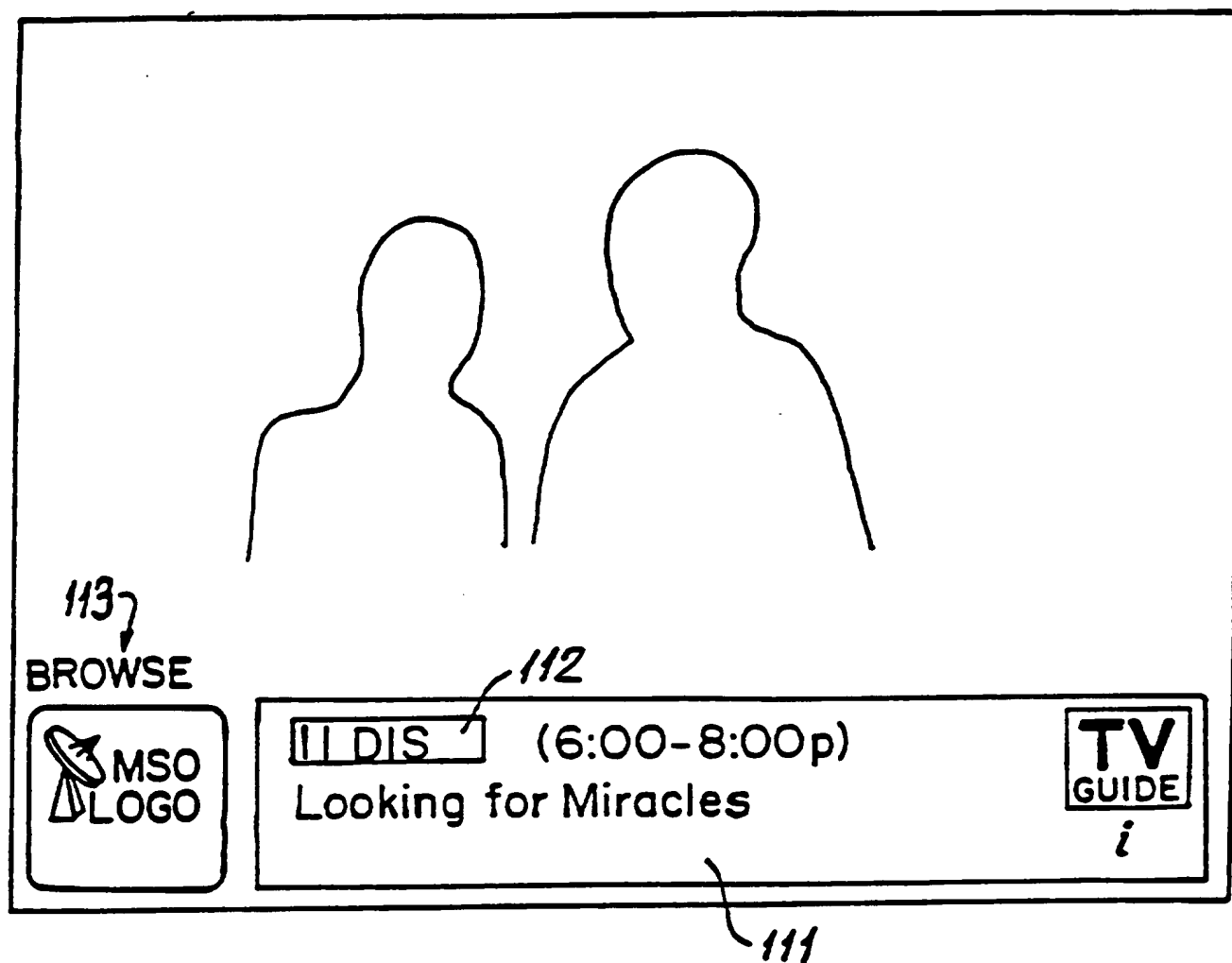


FIG. II

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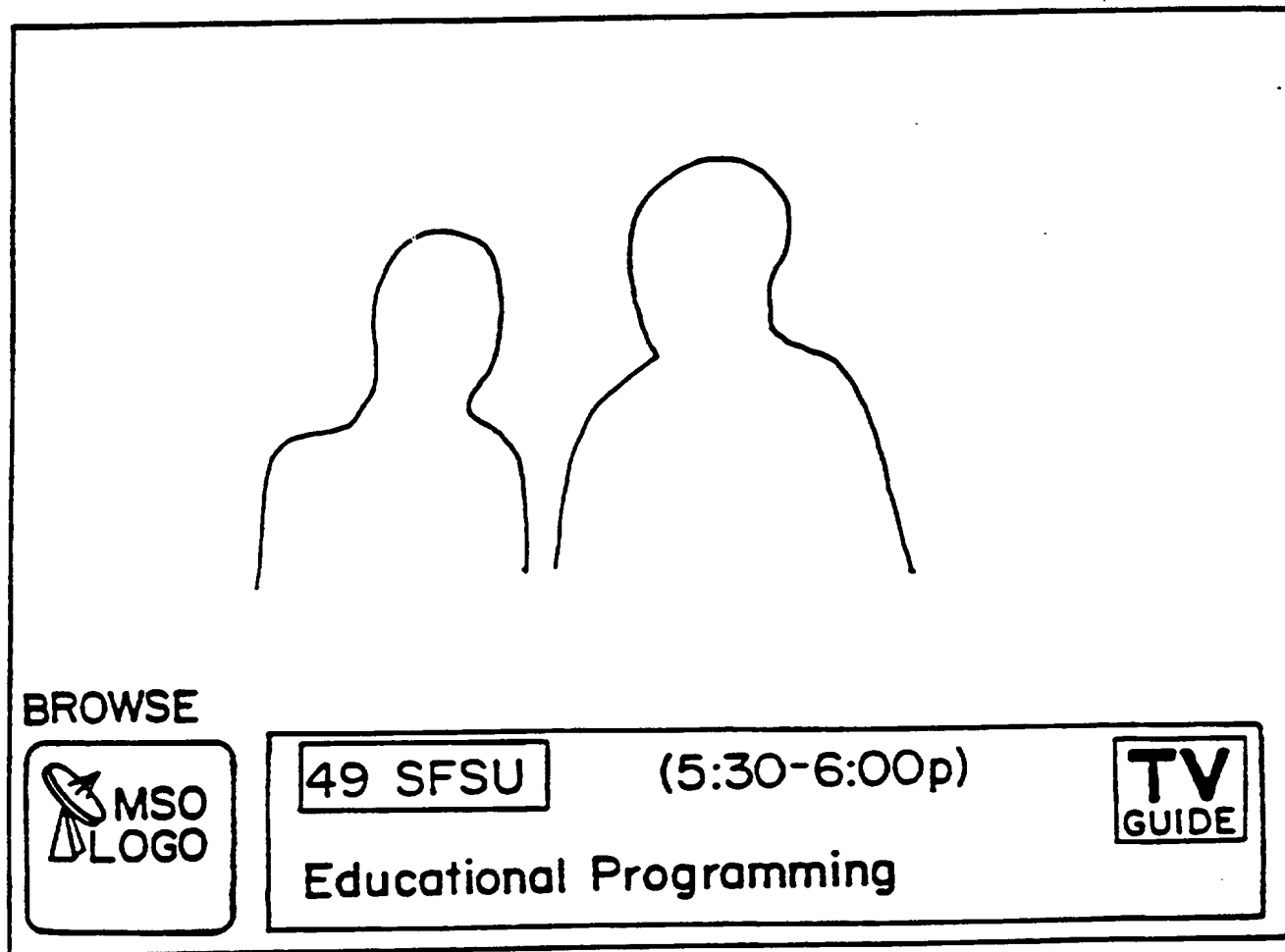


FIG.12



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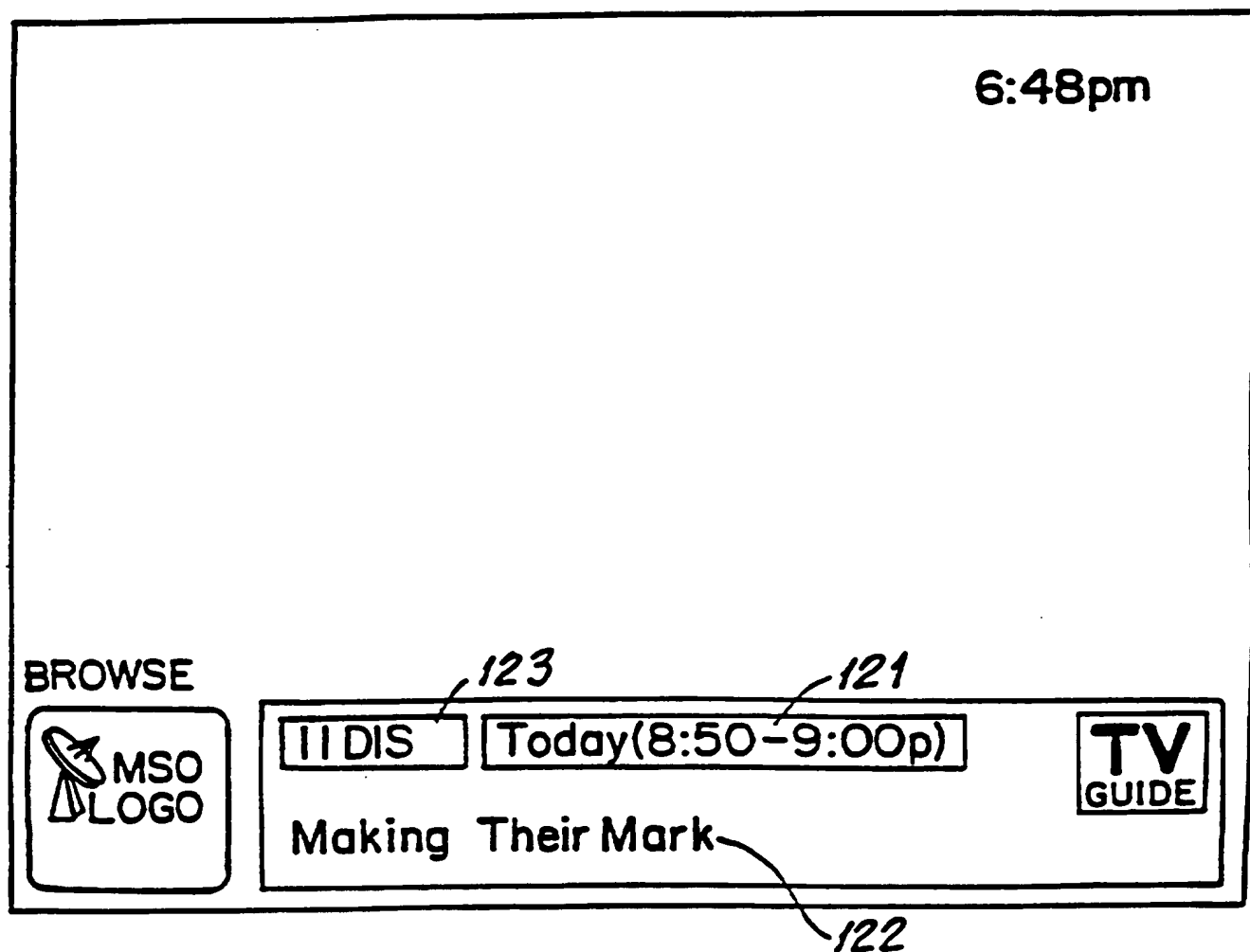


FIG. 12A

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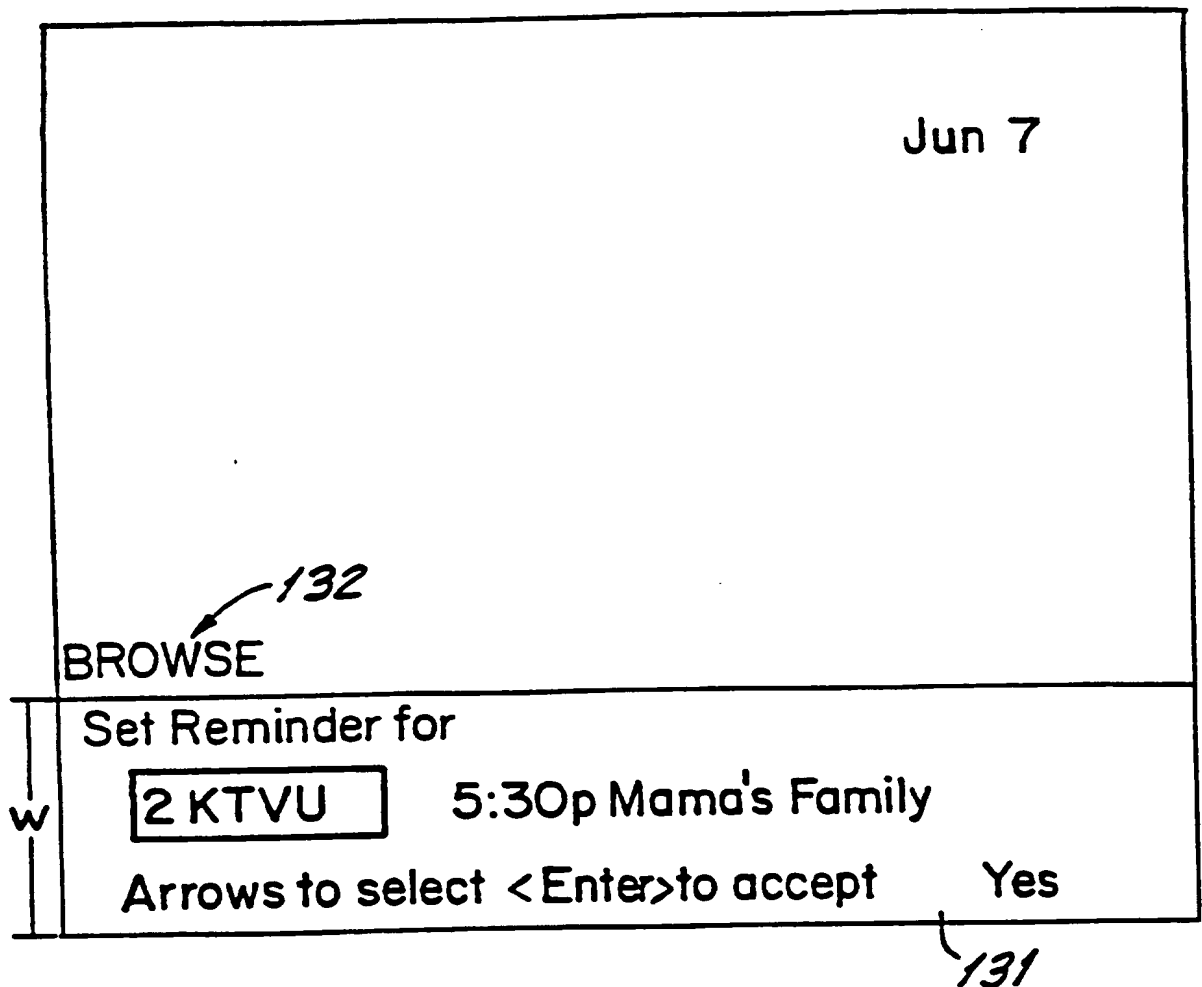


FIG.13

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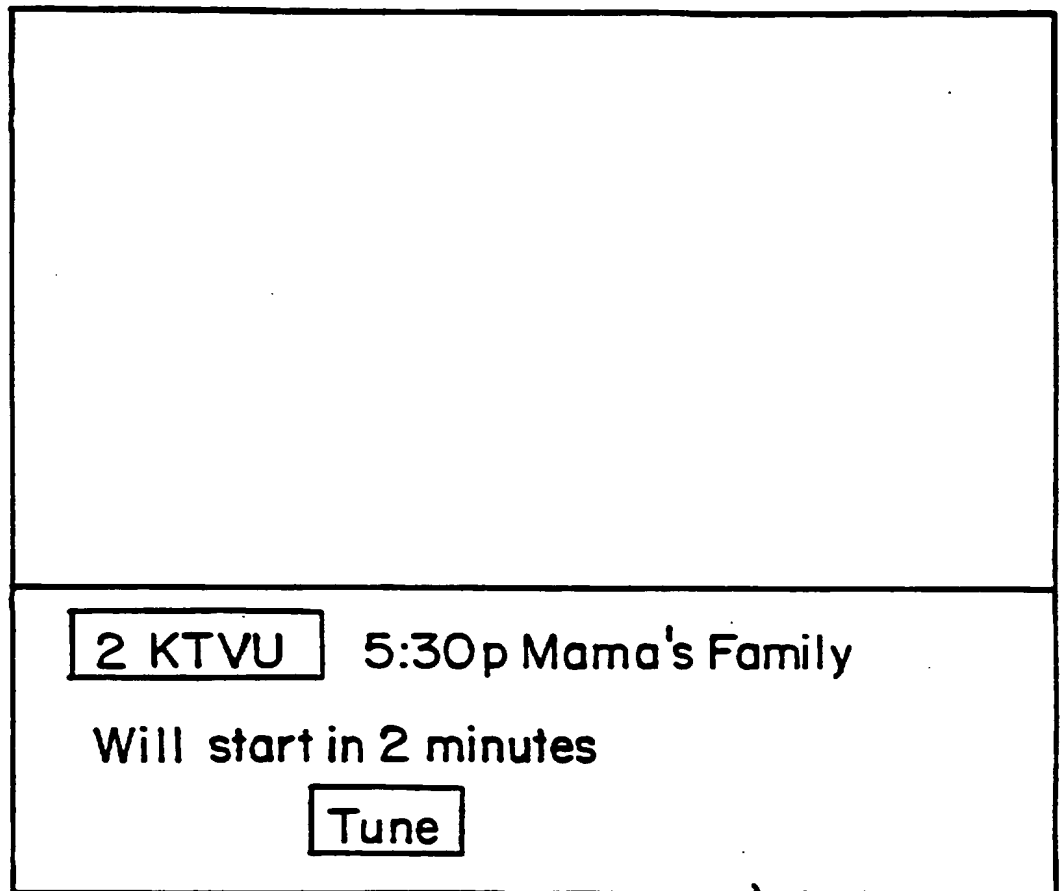


FIG.14

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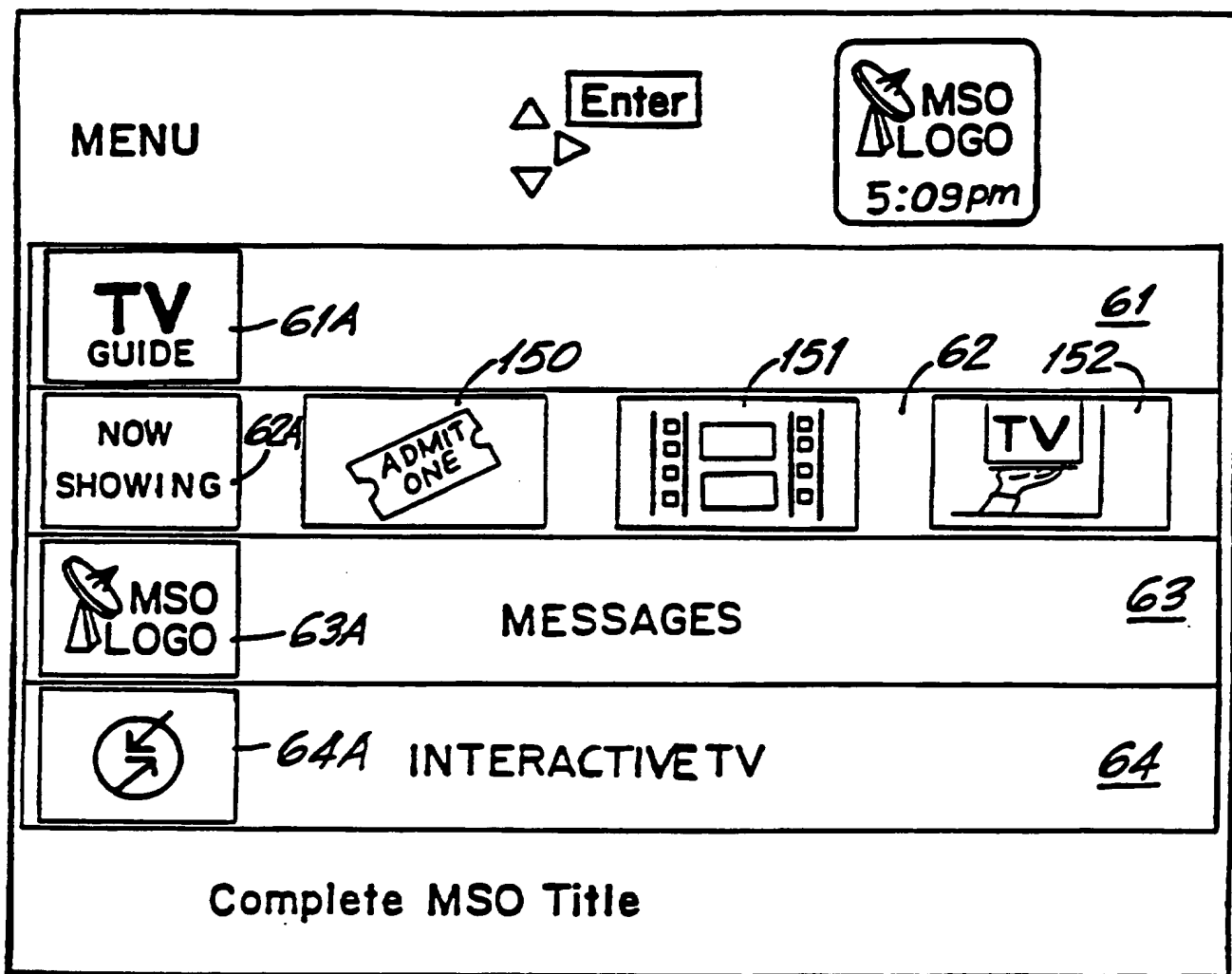


FIG.15

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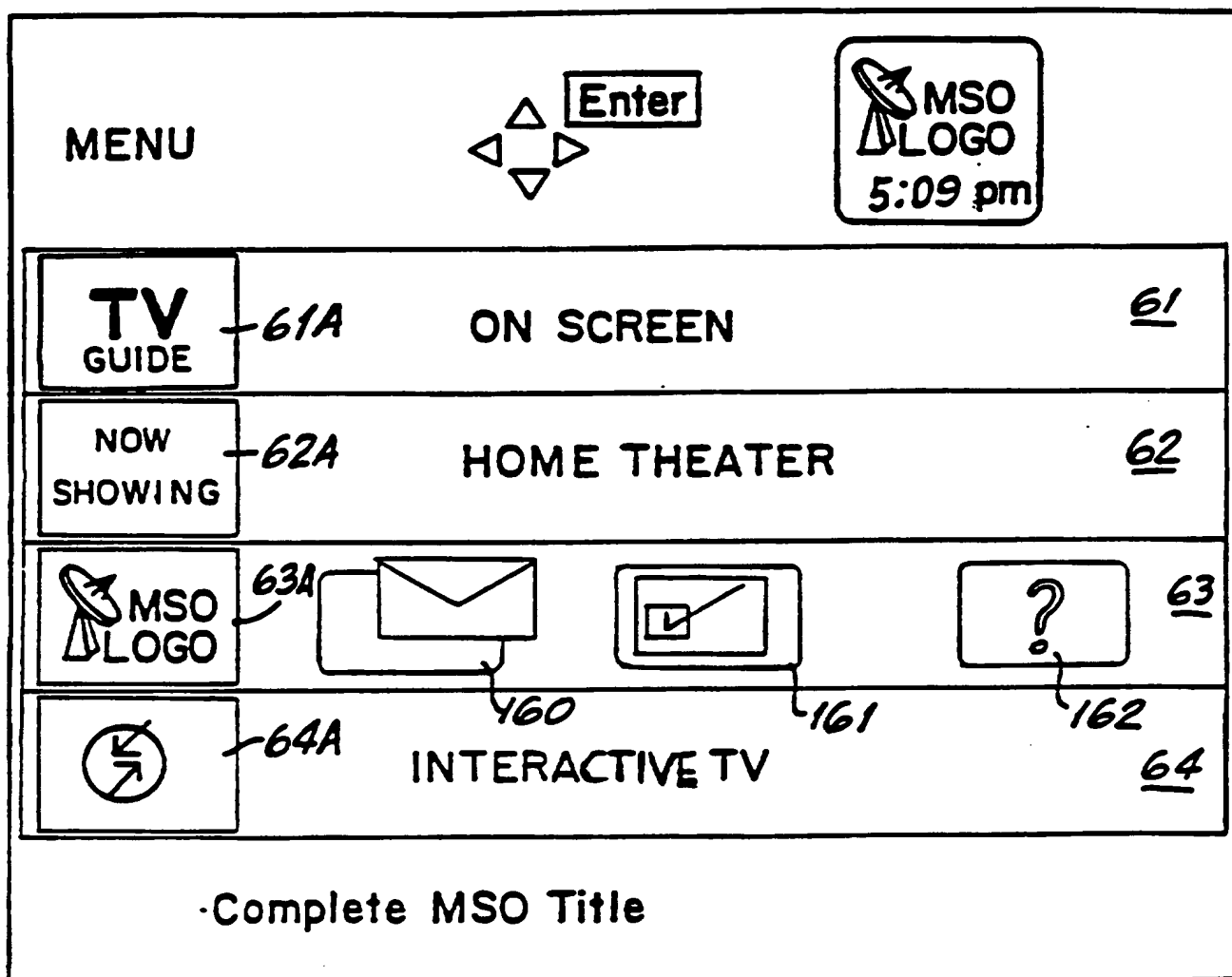


FIG. 6

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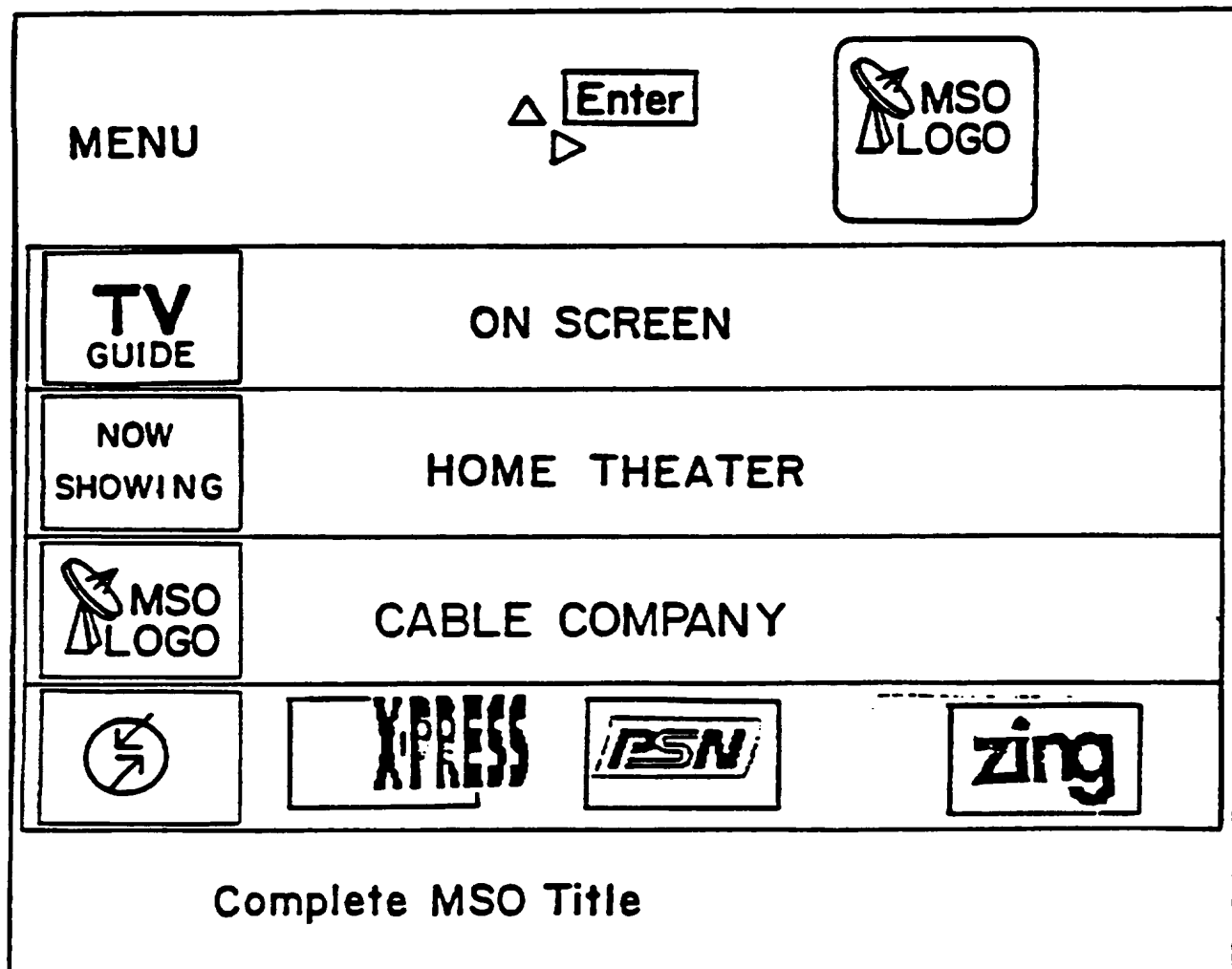


FIG.17

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**Alt-180 Listings**

△ Enter

▽ i

184

**TV GUIDE**

7:13 pm

182

183

4 KRON Baseball (4:30 - 7:30p)		i		
Today	7:00p	7:30p	8:00p	8:30p
4 KRON	Baseball	Ent. Tonight	Fresh Prince	Blossom
5 KPDX	Evening Shade	Major Dad	Murphy Brown	
6 HBO	JFK: In His Own Words		JFK	
7 KGO	Jeopardy!	Wheel of Fortune	Day One	

FIG. 18

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**Listings By**

**Category**, 190A, 190B

Enter [ ] 190C

[ ] Movies [ ] Sports [ ] News [ ] Children

[ ] Today

22 LIF	4:00p A Case of Deadly Force	i
1 HOT	4:00p Ring of Fire II: Blood and Steel	i
34 AMC	4:00p Texas Across the River	i
31 MAX	4:00p The Ballad of the Sad Cafe	i
8 SHO	5:00p Big Girls Don't Cry - They Get Even	i
46 BRV	5:00p Queen of Hearts	i
27 TMC	5:00p The Roaring Twenties	i
25 TBS	5 05p No Mercy	i

TV GUIDE 5:45 pm

**୧୮୬**



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Listings By

Channel

PREV  KRON  KPIX

Today

4:30p Baseball	<input type="text" value="1"/>
7:30p Entertainment Tonight	
8:00p Fresh Prince	
8:30p Blossom	
9:00p Perry Mason: Notorious Nun	<input type="text" value="1"/>
11:00p News	
11:30 Tonight	
12:30a David Letterman	

FIG. 20

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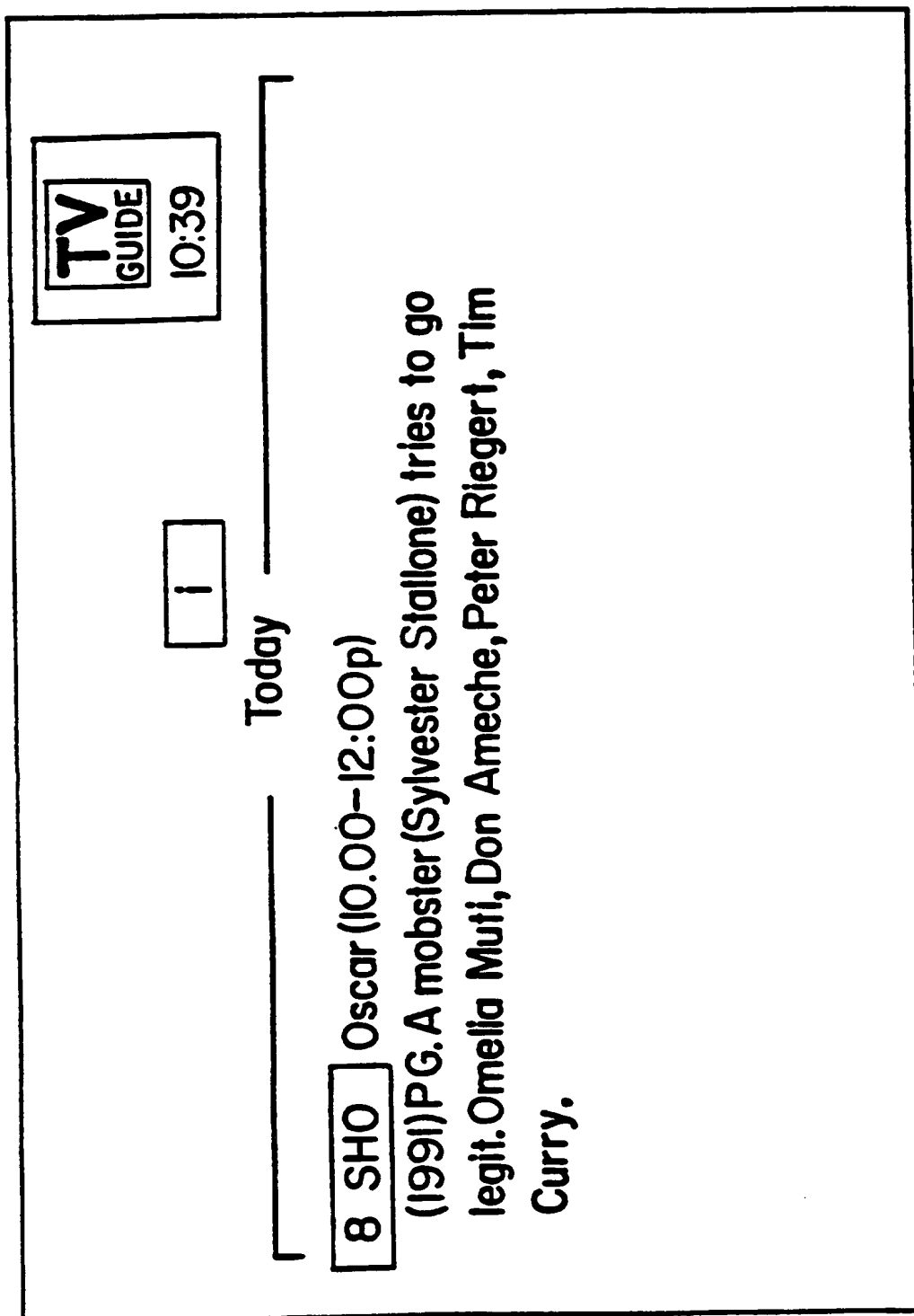


FIG. 21

**23/57**

**PayPer View**

Select choice  DER!

Press additional Information Press

**NOW SHOWING**

For Movies

- Party Incorporated
- Passenger 57
- Pet Sematary Two
- Ring of Fire It Blo
- The Distinguished Gentleman

**FIG. 22**

24/57

Pay Per View Ordering	<div>Enter</div> <div>▽ ▽</div>	<div>MSO LOGO 5:49 PM</div>
Passenger 57		
What time would you like this show to start?		
Today 9:00p <sup>230B</sup> Tomw 12:00p Tomw 6:00p <sup>230C</sup>		
Today <u>9:00p</u> <sup>230A</sup> Tomw 12:00p Tomw 6:00p		
Would you like to see a countdown onscreen just before the show start		
<div>Yes</div> <div>No</div>		
<div>PPV /</div> <div>/ Source</div>		

FIG.23

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Pay Per View Confirmation	◁	Enter	 MSO LOGO 5:49 pm		
You have requested to order:					
Passenger 57		\$ 3.99			
NO, I DO NOT WANT TO ORDER.					
<table border="1"><tr><td>PPV /</td></tr><tr><td>/ Source</td></tr></table>				PPV /	/ Source
PPV /					
/ Source					

FIG.24

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<b>Pay Per View Confirmation</b>					
<b>You have requested to order:</b>					
<b>Passenger 57</b>	<b>\$ 3.99</b>				
<b>Yes, I would like to order</b>					
<b>Passenger 57 has been Ordered! Tune to Channel 1 Today at 9:00pm.</b>					
<table border="1"><tr><td><b>PPV</b></td><td></td></tr><tr><td></td><td><b>Source</b></td></tr></table>		<b>PPV</b>			<b>Source</b>
<b>PPV</b>					
	<b>Source</b>				

FIG.24A

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LISTINGS		 Listing				6:06P AUG 16
5:00	5:30	6:00	6:30	7:00	7:30	8:00
NBC	<b>4</b>	News				
ABC	<b>6</b>	News				
CBS	<b>10</b>	CBS News				
Fox	<b>28</b>	Club Paradise (5:00)				
PBS	<b>29</b>	Mystery!				
COM	<b>30</b>	Tribute to Carson				
HBO	<b>33</b>	Gremlins 2: The New Batch				
ESN	<b>34</b>	Tennis (4:30)				
AMC	<b>35</b>	Arise my Love (5:00)				
DSC	<b>37</b>	Natural World				
NIK	<b>38</b>	I Love Lucy				

FIG.25

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Premium Services	<input type="button" value="Enter"/>	 5:03pm
<input type="button" value="HBO"/>	Home Box Office \$10.40/Month	
<input type="button" value="SHO"/>	Showtime \$9.95/Month	
<input type="button" value="DIS"/>	The Disney Channel \$9.95/Month	
<input type="button" value="TMC"/>	The Movie Channel \$1.50/Month	
<input type="button" value="MAX"/>	Cinemax \$9.95/Month	
<input type="button" value="PLA"/>	Playboy at Night \$4.95/Evening(5:00pm to 3:00am)	
<input type="button" value="ACT"/>	Action \$5.95/Day(11:00pm to 3:00pm)	
Movie, special events, and family programming!		
You are not a Subscriber. Press <input type="button" value="Enter"/> to Subscribe!		

FIG.26



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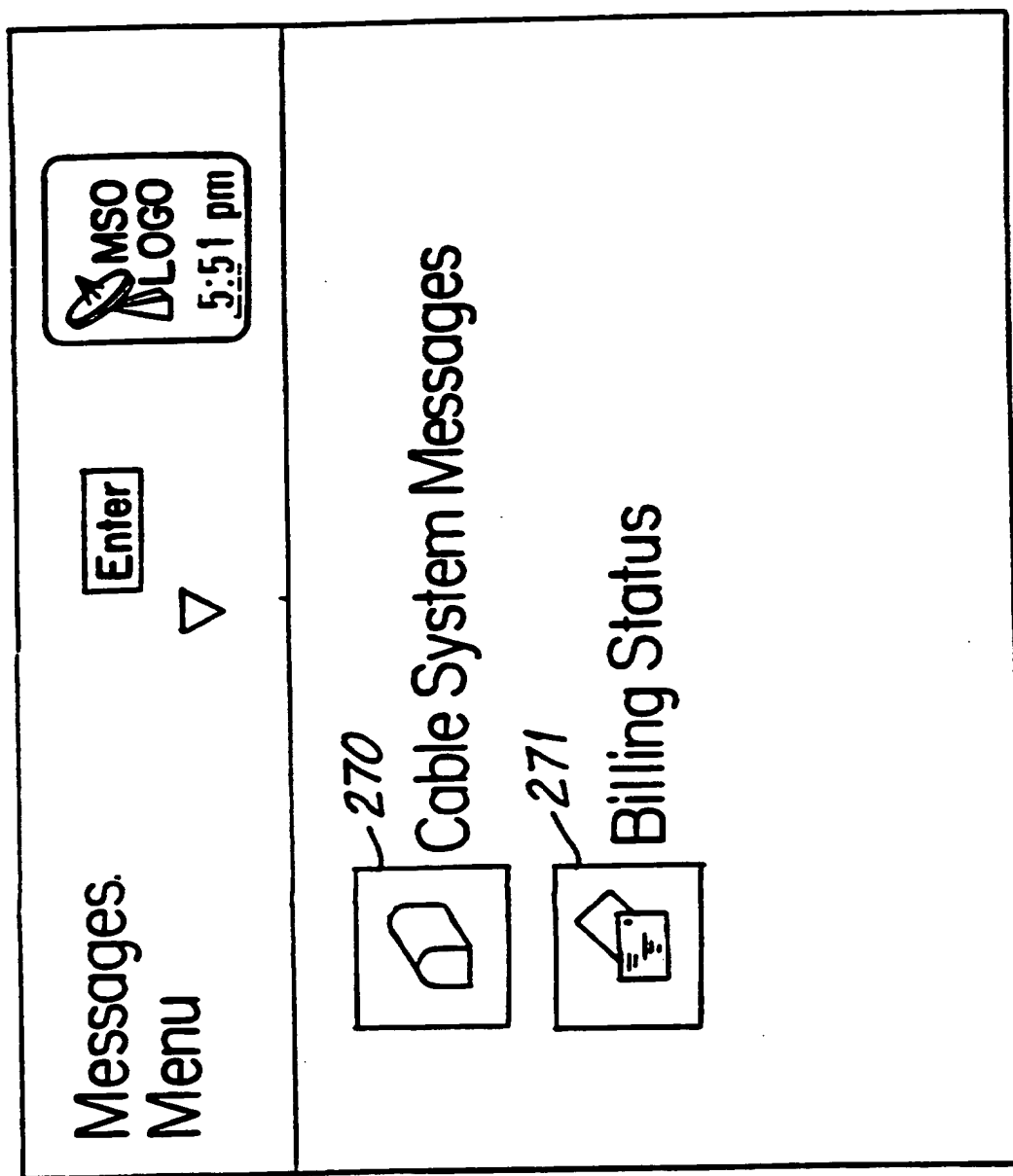


FIG.27

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<p>Cable System Messages</p>	<div>  <p>MSO LOGO 5:52 pm</p> </div> <p>Pay Per View is featuring "Batman Returns" this month.</p> <p>Get a free sneak peek of HBO this weekend.</p>	<p>Complete MSO Title</p>
------------------------------	--	---------------------------

FIG.28

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<b>3/17</b>	Free HBO Preview	Tonight
<b>3/22</b>	Pay Per View Movie Sale	Will be on Tonight only
<b>2/28</b>	New Channel	Next Week on your Cable Networ



<b>12/23</b>	California Earthquake	Reeks Havoc on TV
<b>3/25</b>	President Clinton	Address
<b>3/30</b>	PBS Pledge Drive	Begins Tonight with Auction

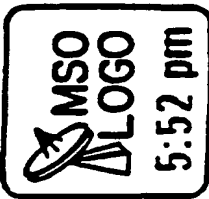


To move between cable system and TV Guide mailboxes, use Left/Right arrows. To read messages, use Down arrow: when headline is highlighted, full message appears in this space.

FIG. 28A

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# Billing



Name: TV Guide Onscreen Acct.#: 12345-098765-08-9  
 Billed From: 05/25/93 Billed To: 06/25/93 Total: \$3.99  
 FOR CUSTOMER SERVICE CALL: 790-0900  

Date	Time	Service / PPV Event	Cost
06/07/93	9:00 p	PASSENGER 57	\$3.99

FIG.29

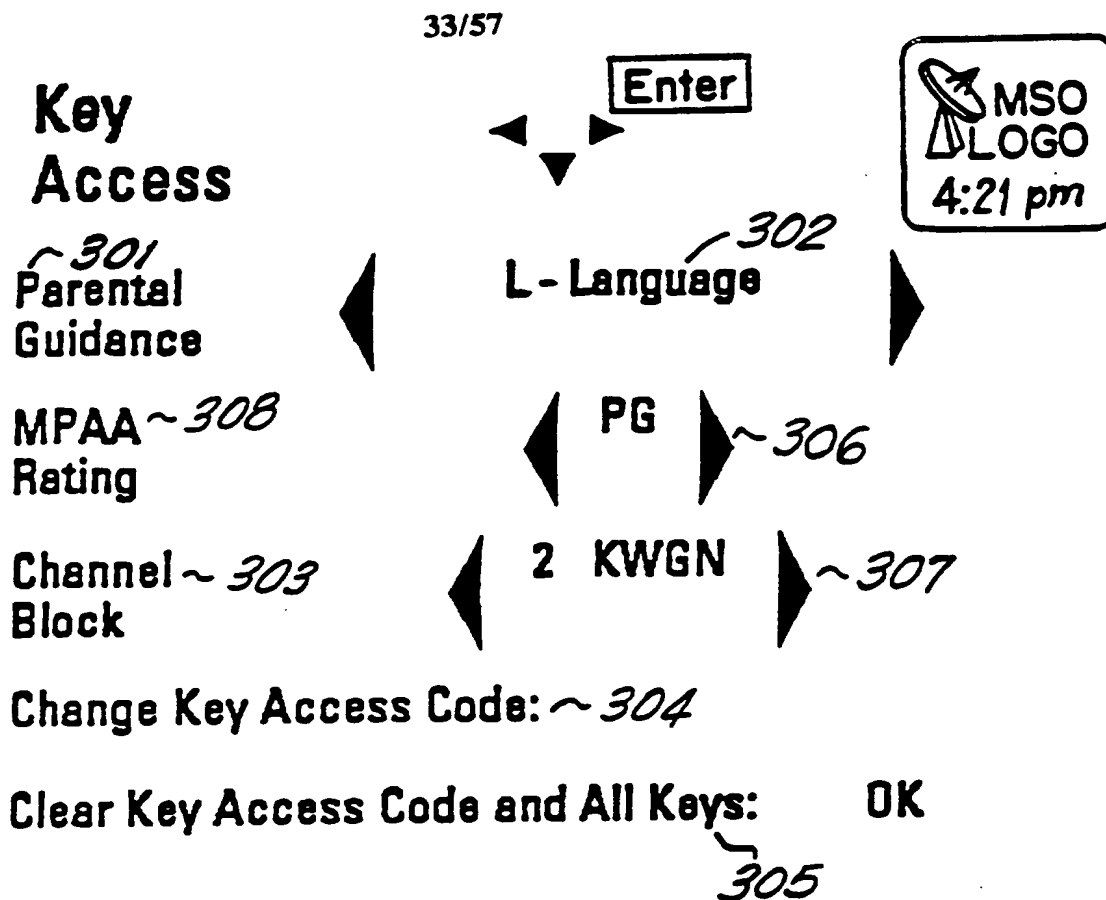


FIG.30

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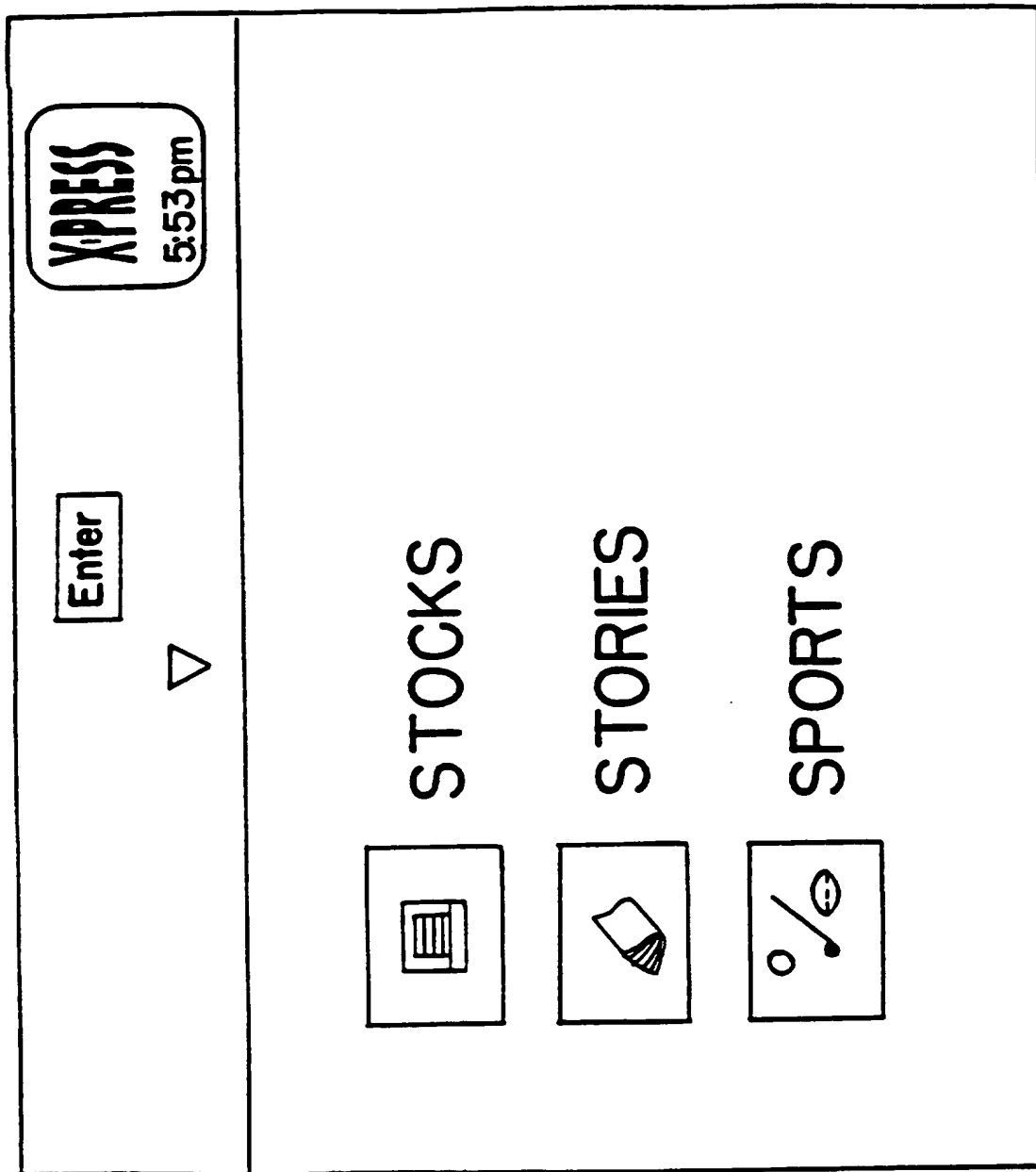


FIG. 31

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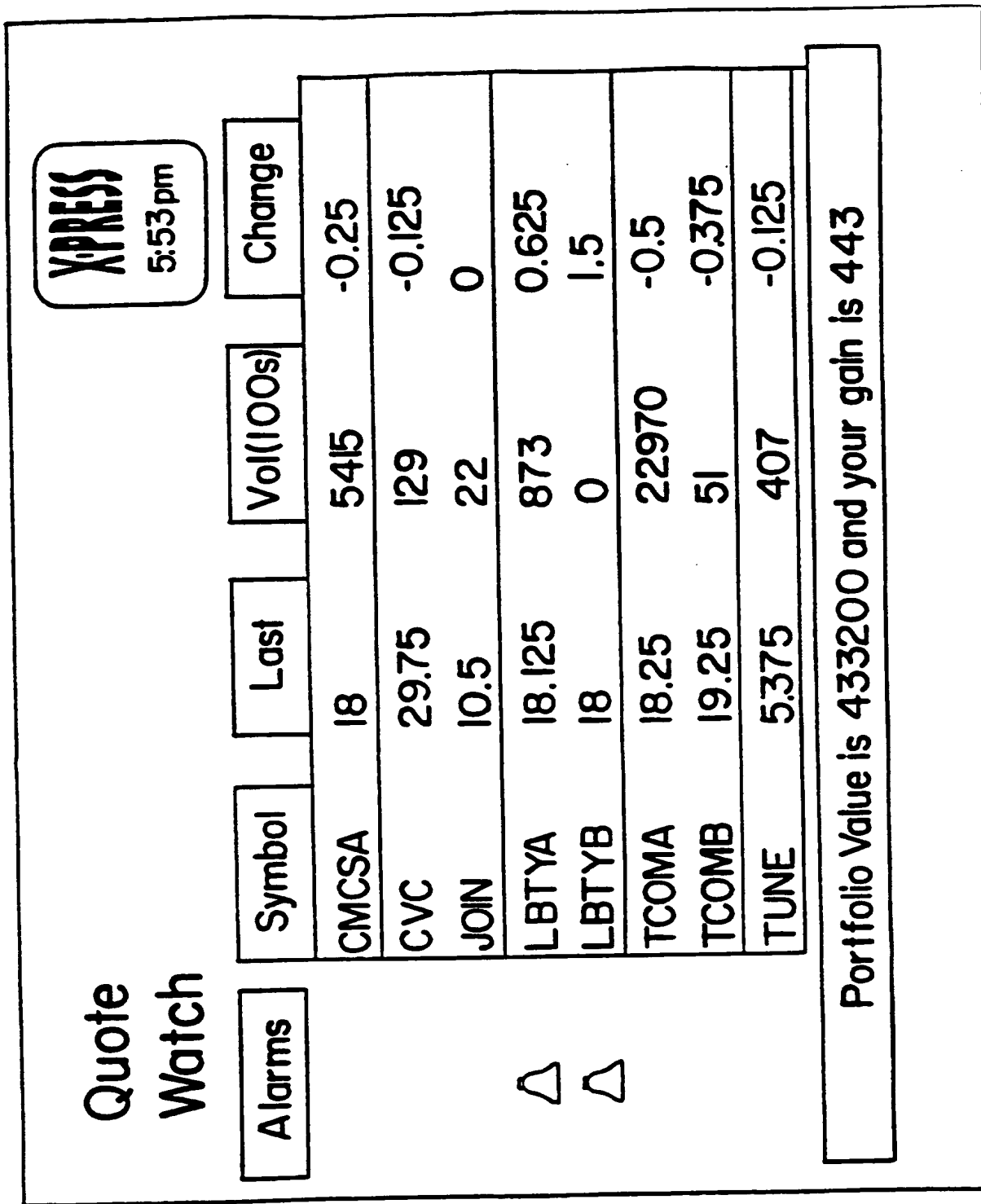


FIG. 32

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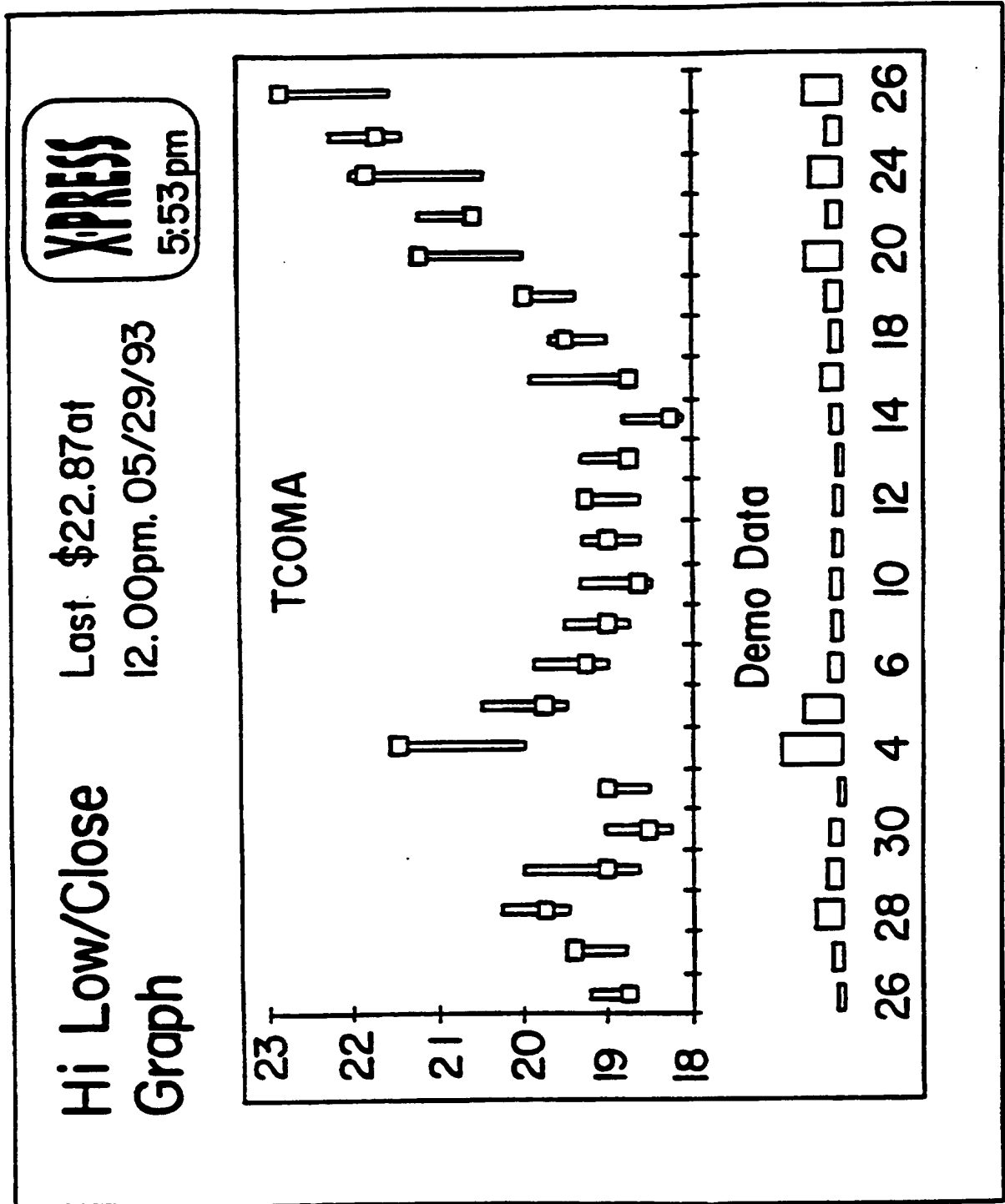


FIG. 33



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**STORIES****US World News****Cubans use Vitamins to combat epidemic**

**Geneva - A costly campaign to provide vitamins to all Cubans has helped curb a mysterious epidemic that has afflicted thousands with vision problems, a World Health Organization official said yesterday.**

**The outbreak of optical neuritis has dimmed the vision of about 20,000 Cubans and a related malady has affected 6,000 other people, mostly women.**

**FIG.34**

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**SPORTS**

**X-PRESS**

5:54 pm

---

**Major League Baseball**

**Yesterday in National League Action**

**Colorado 7, Houston 5**

**San Francis co 5, Chicago 4**

**Yesterday in American League Action**

**Detroit 4, Boston 1**

**Toronto 4, Milwaukee 2**

**FIG.35**

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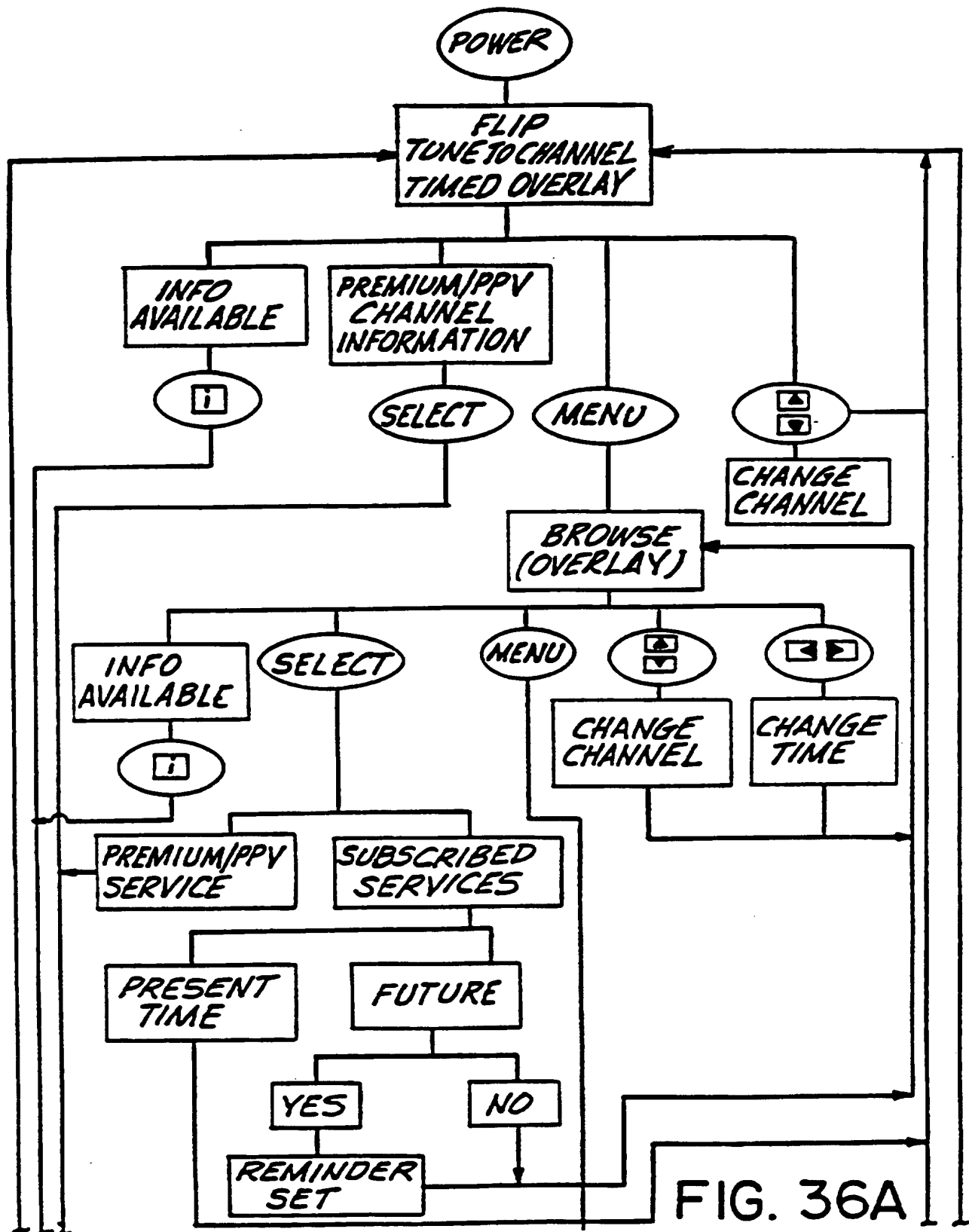


FIG. 36A

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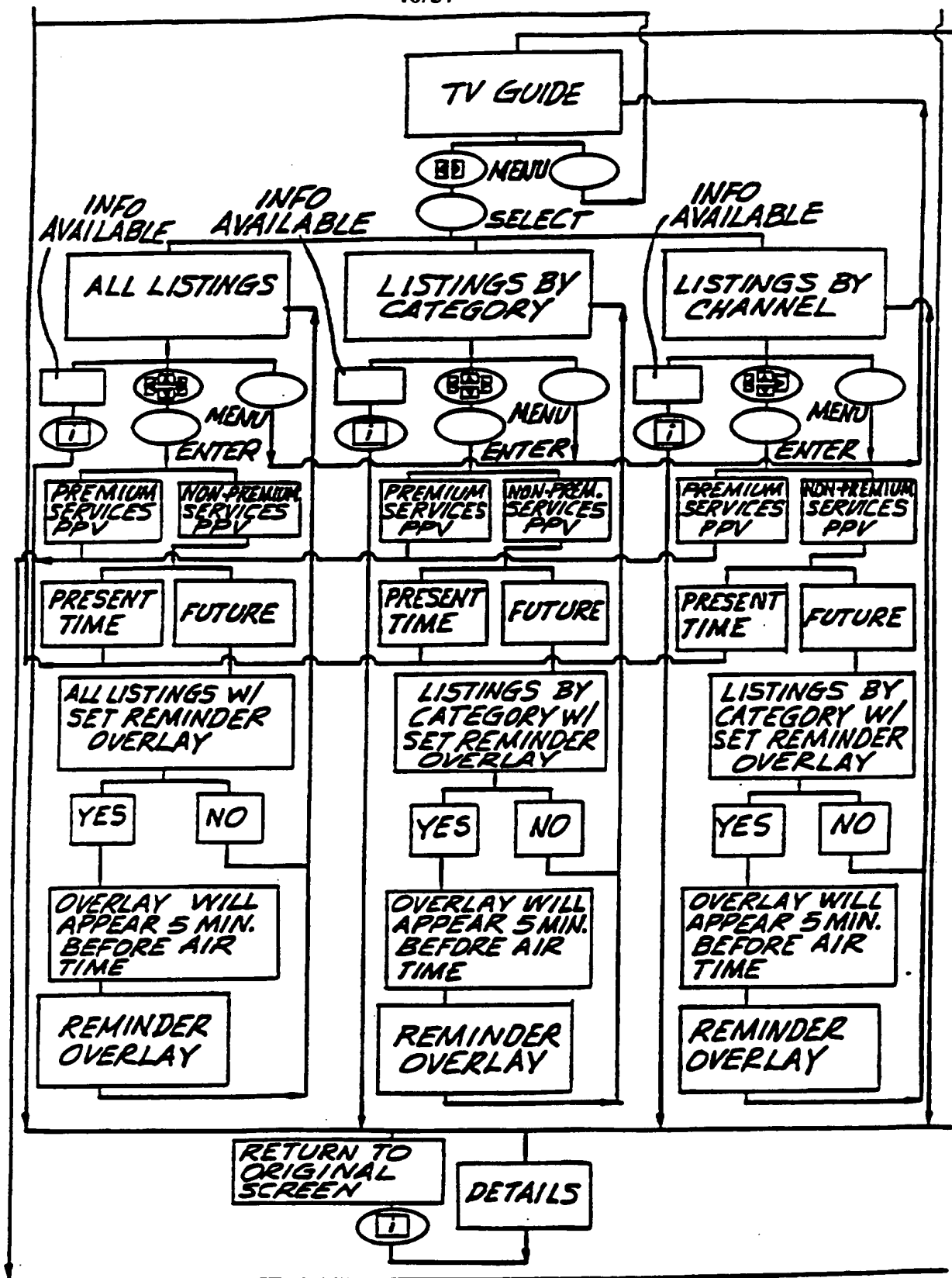


FIG. 36B

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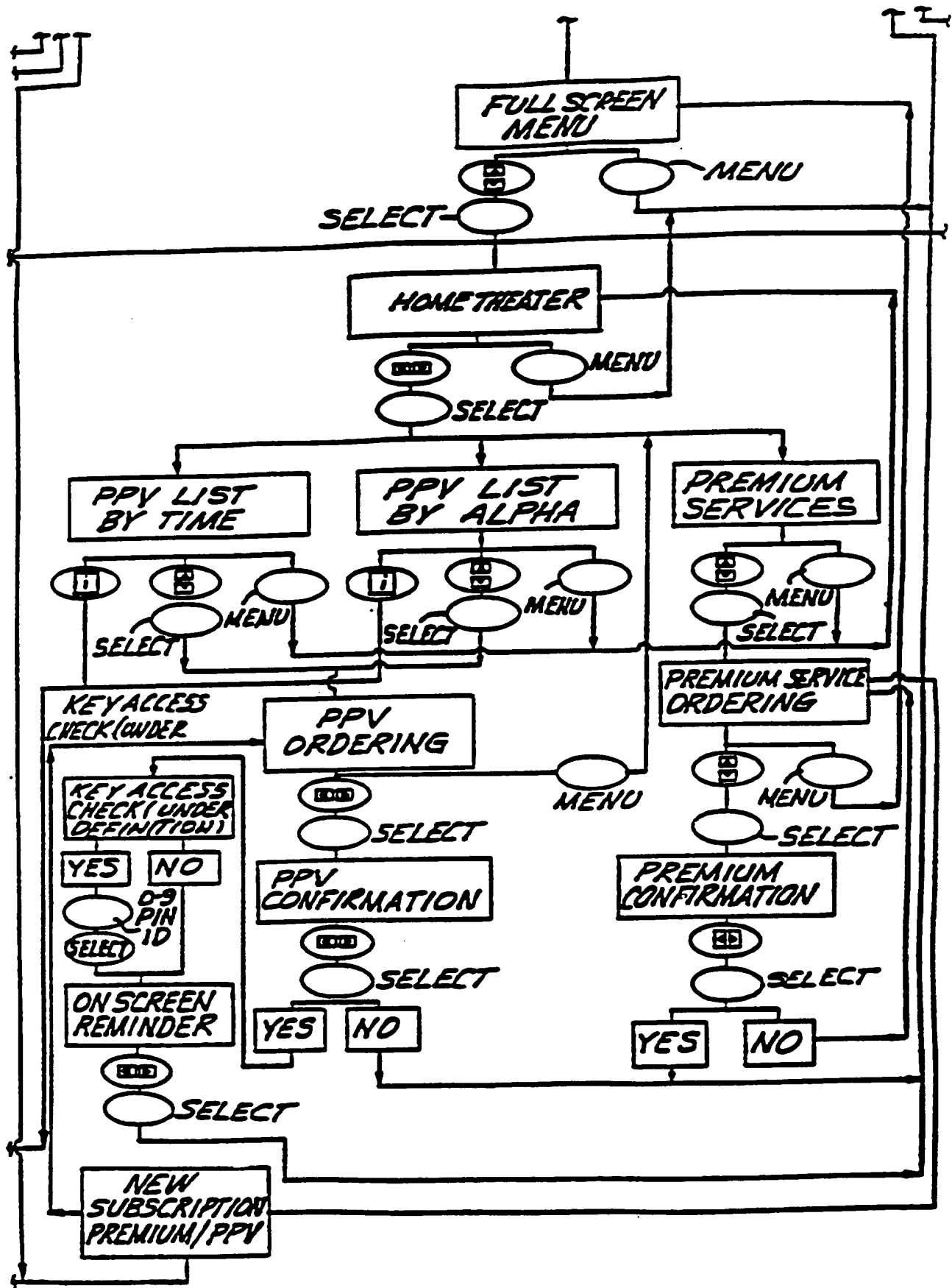


FIG. 36C

SUBSTITUTE SHEET (RULE 26)

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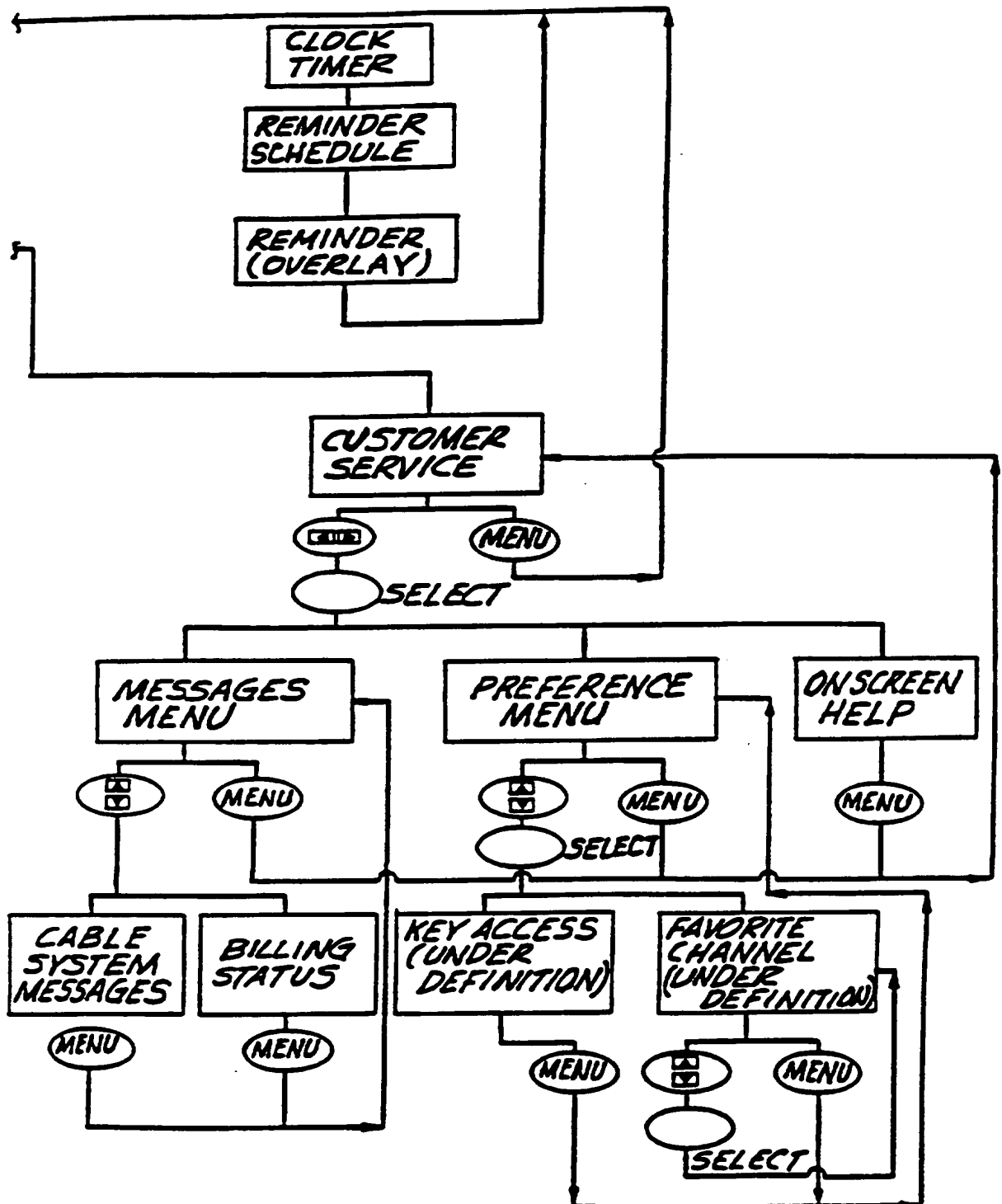


FIG. 36D

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*201*

**TV**  
GUIDE

LOCATOR

✉

Broadcast:	◀ <span style="border: 1px solid black; padding: 2px;">2 KWGN</span>	3 PPV	4 KCNC ▶
Cable:	◀ 41 A&E	3 AMC	24 BET ▶
Premium:	◀ 21 DIS	18 ENC	14 HBO ▶
PPV:	11 REQ1	15 REQ2	

Clear ALL favorite channels

Favorite Channel

Included

Excluded

Press \* — Lines to illustrate text

FIG. 37

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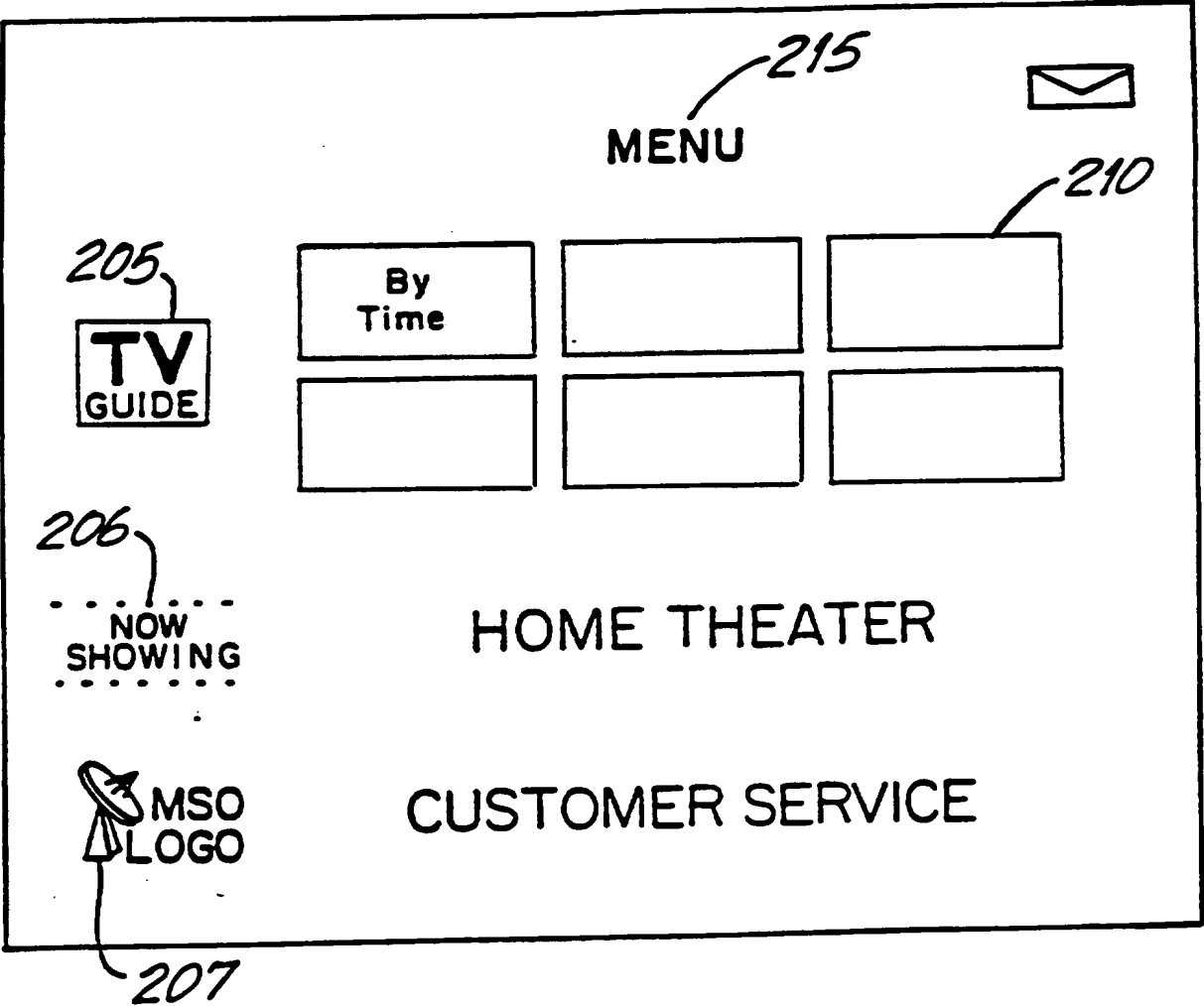


FIG.38



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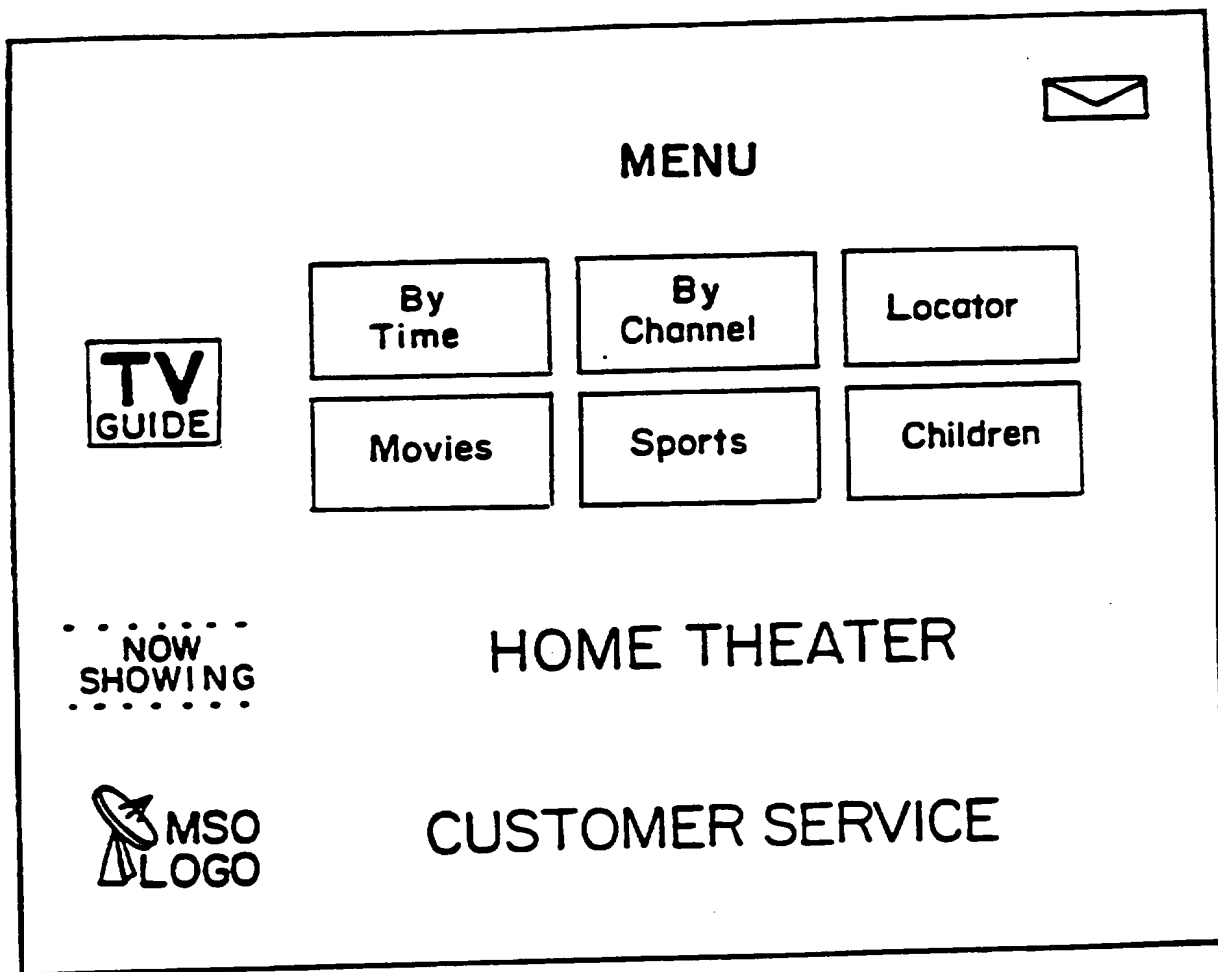


FIG. 38A

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<b>TV</b> GUIDE	<div>TODAY 7:30PM</div>		
	Extra	Extra Line	
51CSPN2	Gov't Program(10-10a)		
52 SPICE	<b>Mom and Dad Save the World (4-6p)</b>		
53 KWHD	Religious Programming(12-12m)		
54 MUN2	Public Access(12-12m)		
2 KWGN	NBA Basketball (6-30-9p)		
<div> <b>Mom and Dad Save the World \$4.99</b>            You have requested this program at 4PM.            To complete the ordering process,            enter your four-digit purchase code.            Purchase Code:  </div>			

FIG. 38B

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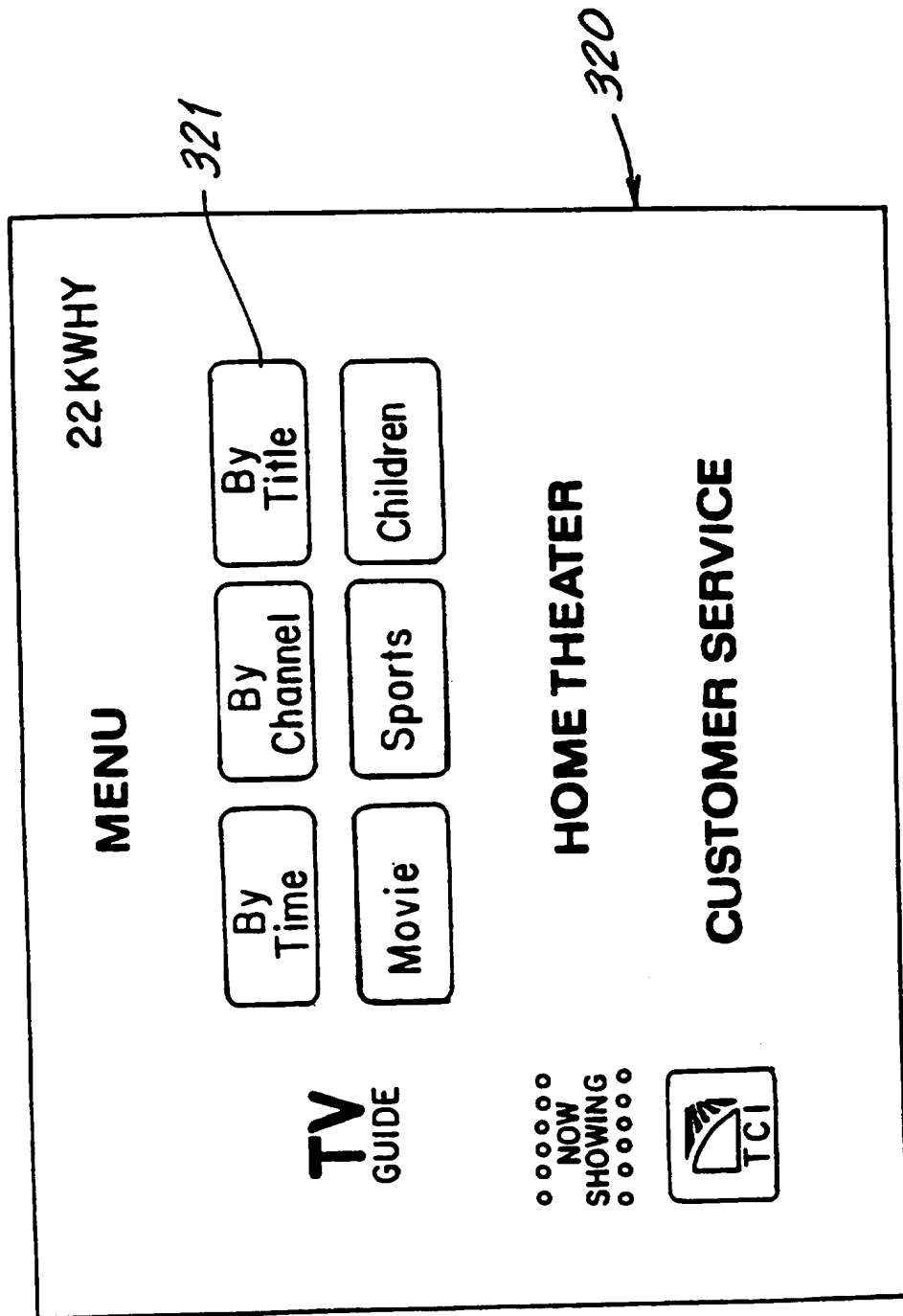


FIG. 38C

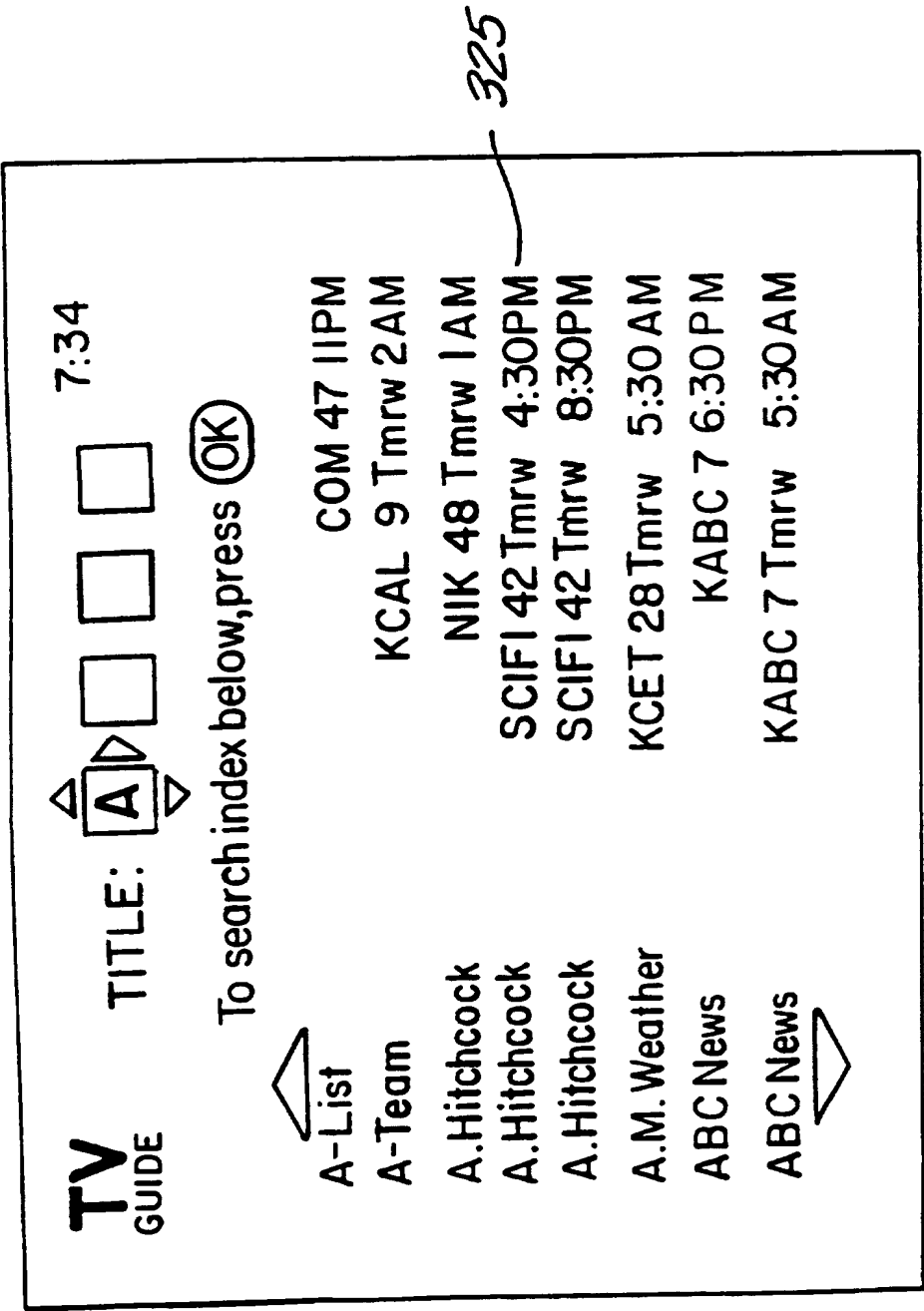


FIG.38D

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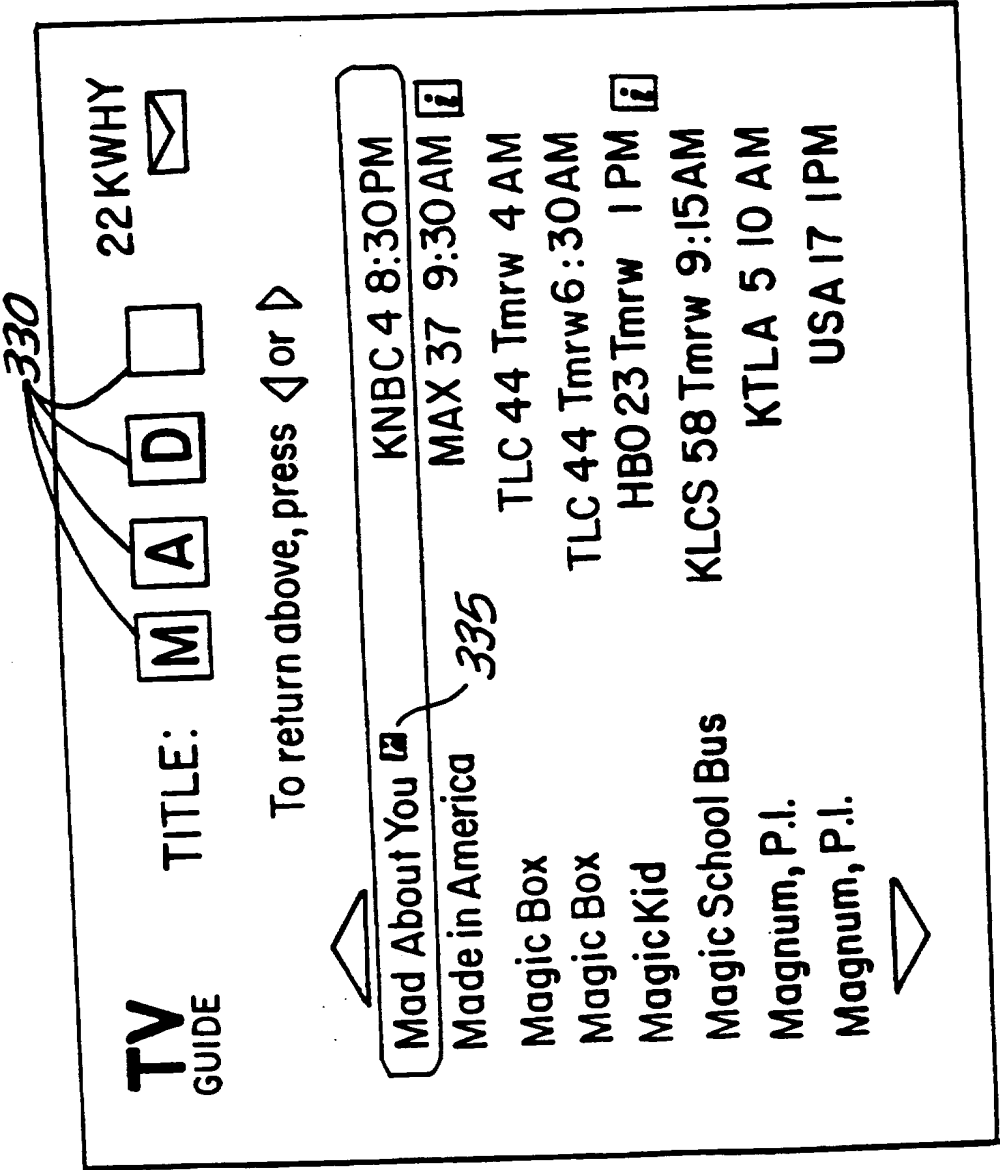






FIG.38E

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**TV**  
GUIDE

TITLE: M A D

22 KWHY 

330   

To search index below, press OK



Mad About You

Made in America

Magic Box


Magic Box

Magic Kid

Magic School Bus

Magnum, P.I.

Magnum, P.I.



KNBC 4 8:30 PM

MAX 37 9:30 AM i

TLC 44 Tmrw 4 AM

TLC 44 Tmrw 6:30 AM

HBO 23 Tmrw 1 PM i

KLCS 58 Tmrw 9:15 AM

KTLA 5 10 AM

USA 17 1 PM

FIG. 38F

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<b>TV</b> <b>GUIDE</b>			
Movie Rating:	◀ 	PG	PG-13 R ▶
Parental Guidance:	◀	Adult Themes	Sexual Situations ▶
Channel:	◀ 2 KWGN	3 PPV	4 KONC  ▶
Locked Program:	To lock out a program or series. see *Help*		
Lockout Code:	Clear	Change	

FIG. 39

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260

**TV**  
**GUIDE**

275

Text Location:

Lockout Code:

265

Purchase Code:

270

This button sets the text location to the bottom of the  
Screen.  
Press  to select

FIG. 40



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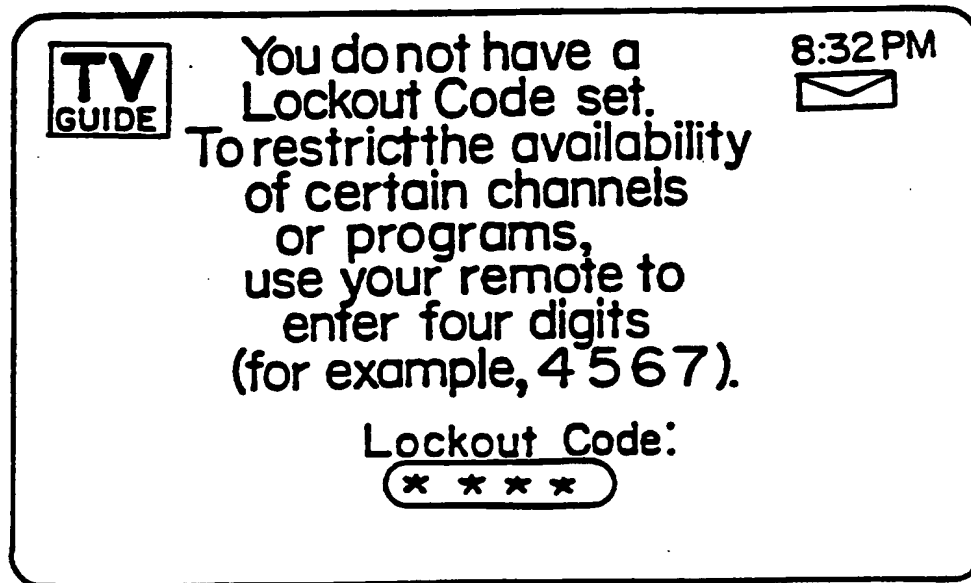


FIG. 40A

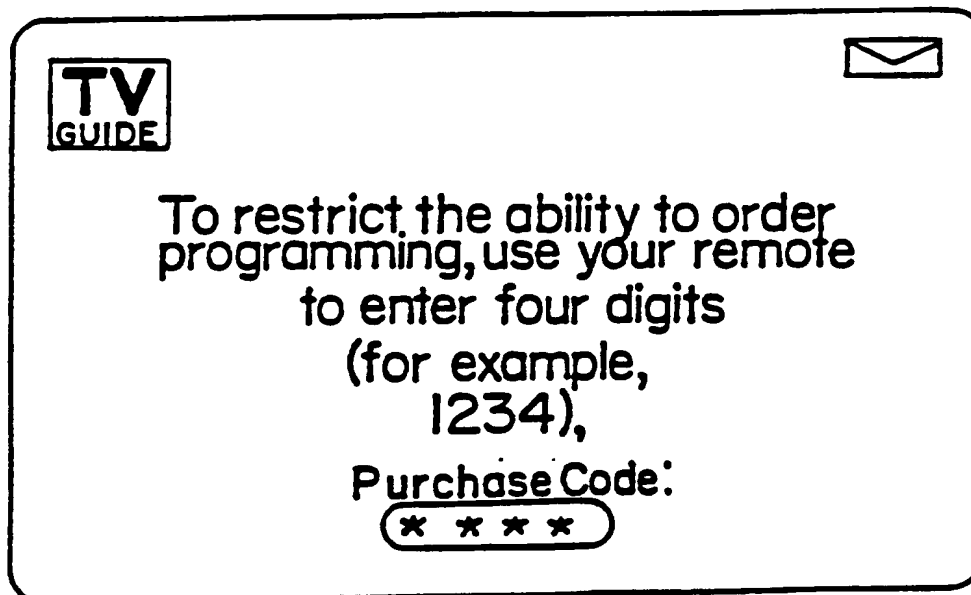


FIG. 40B

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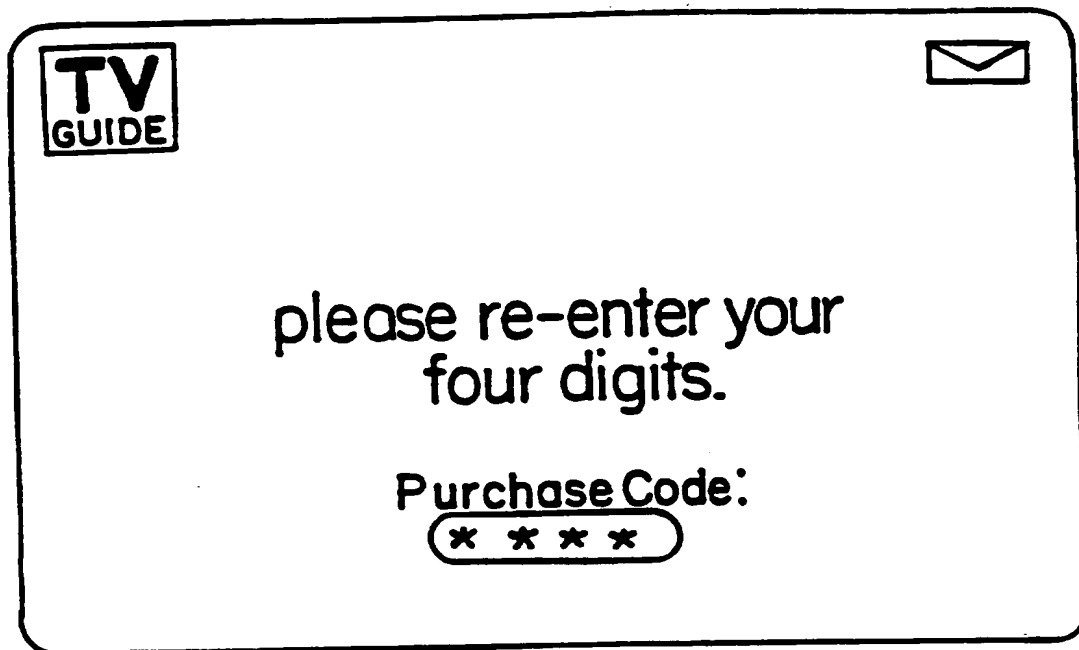


FIG. 40C

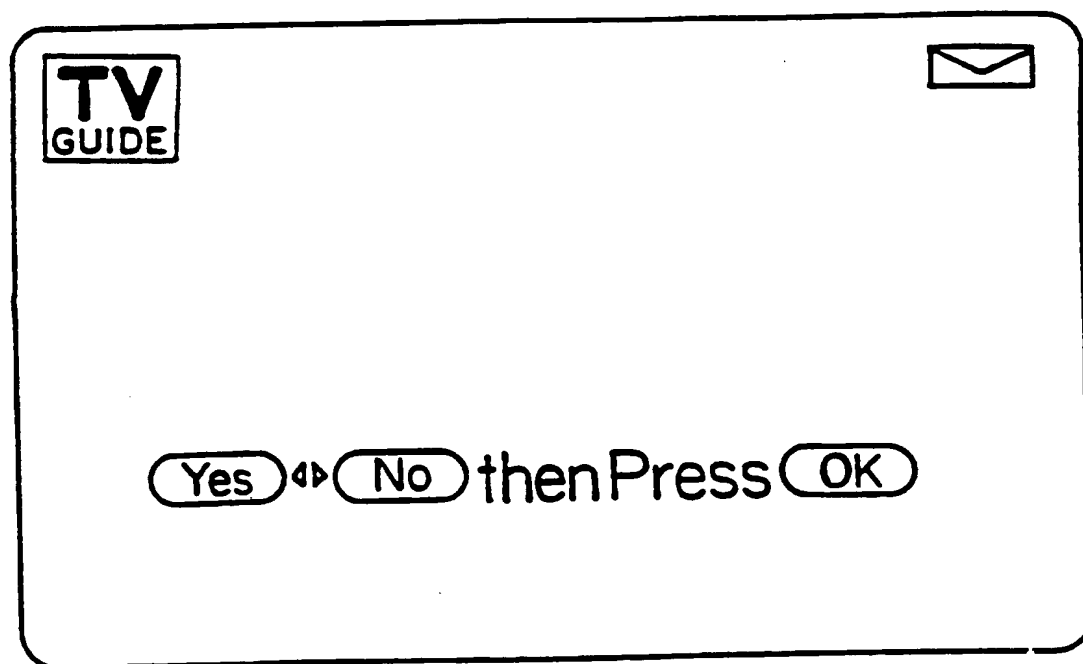




FIG. 40D

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enter your current  
four-digit  
Purchase Code.

Purchase Code:

\* \* \* \*

FIG.40E

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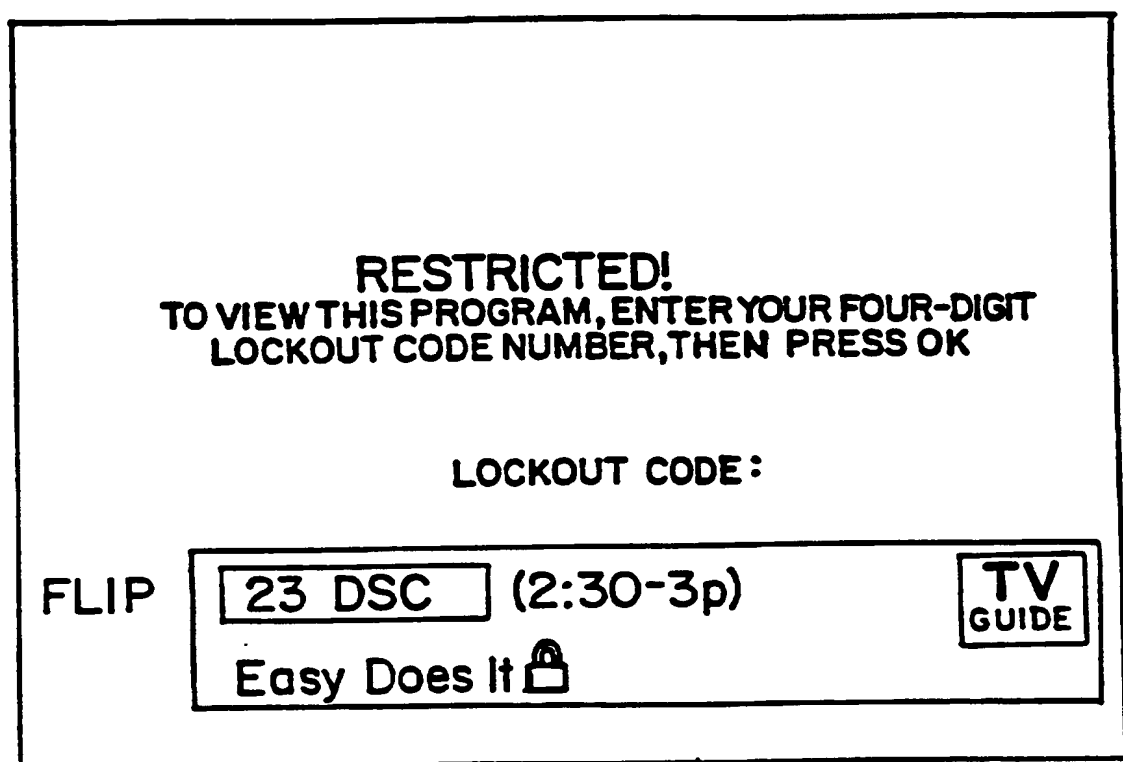


FIG.4I

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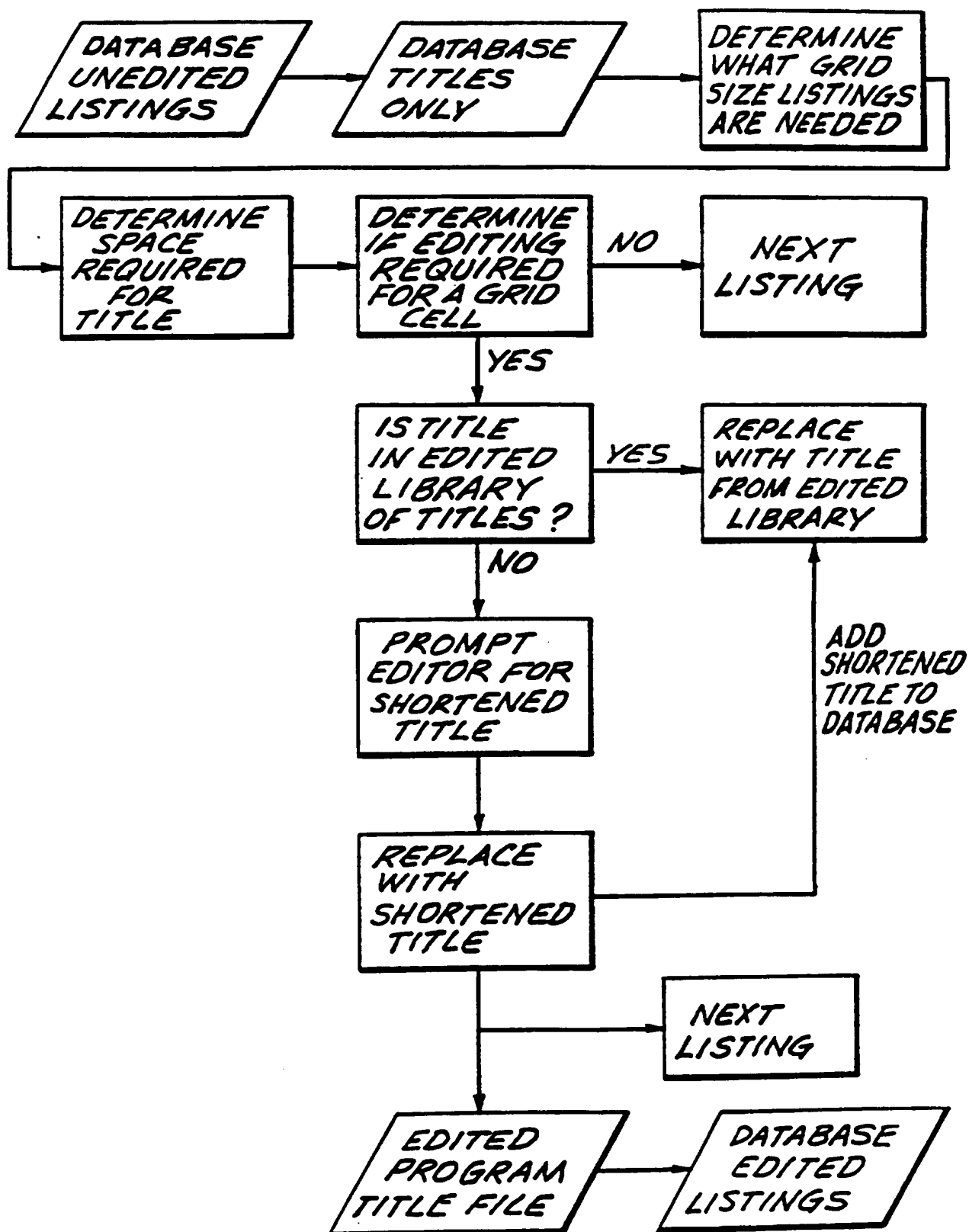


FIG. 42

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 95/15241

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 H04N5/445

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BRUGLIERA V: "DIGITAL ON-SCREEN DISPLAY A NEW TECHNOLOGY FOR THE CONSUMER INTERFACE" 11 June 1993, CABLE TV SESSIONS, MONTREUX, JUNE 10 - 15, 1993, NR. SYMP. 18, PAGE(S) 571 - 586, POSTES;TELEPHONES ET TELEGRAPHES SUISSES XP000379382 see page 582, line 21 - page 586, line 48 ---	1
A	PATENT ABSTRACTS OF JAPAN vol. 015, no. 480 (P-1284), 5 December 1991 & JP,A,03 205673 (MITSUBISHI ELECTRIC CORP), 9 September 1991, see abstract ---	1
A	US,A,4 914 517 (DUFFIELD DAVID J) 3 April 1990 see the whole document -----	1

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Date of the actual completion of the international search

23 April 1996

Date of mailing of the international search report

15.05.96

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